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LETTERS
ON THE
ELEMENTS
OF
BOTANY.

ADDRESSED TO A LADY.

BY THE CELEBRATED

J. J. ROUSSEAU.

TRANSLATED INTO ENGLISH,
WITH NOTES,
AND
TWENTY-FOUR ADDITIONAL LETTERS,
FULLY EXPLAINING THE SYSTEM OF LINNÆUS.

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TO
THE LADIES
OF
GREAT BRITAIN:
NO LESS EMINENT
FOR THEIR ELEGANT AND USEFUL
ACCOMPLISHMENTS,
THAN ADMIRED FOR THE
BEAUTY OF THEIR PERSONS:
THE FOLLOWING LETTERS
ARE
WITH ALL HUMILITY
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THE

TRANSLATOR'S PREFACE.

WHEN the Elementary Letters on Botany (*a*) firſt preſented themſelves to me, in turning over the laſt complete edition of Rouſſeau's Works (*b*), their elegance and ſimplicity pleaſed me enough, to make me give them a ſecond more attentive peruſal. I then thought that they had conſiderable merit; and that if they were diſembarraſſed from the chaos of fifteen quarto volumes, and tranſlated into Engliſh, they might be of uſe to ſuch of my fair countrywomen and unlearned countrymen as wiſhed to amuſe themſelves with Natural Hiſtory.

(*a*) Lettres Elementaires ſur la Botanique a Madame de L***. Melanges, Tome ii. page 531, &c.

(*b*) Collection complete des Oeuvres de J. J. Rouſſeau. Geneve, 1782.

When the tranſlation was done, I perceived, that the foundation only being laid by the ingenious Author, it could be of little ſervice, without raiſing the ſuperſtructure. This I have attempted; not flattering myſelf that it is executed at all in Rouſſeau's manner, which is inimitable; but merely with the deſign of being uſeful.

The ſtudy of Vegetables, having nothing abſtruſe in it, lies within the compaſs of every perſon who has leiſure: but hitherto it has been locked up in the learned languages, and overwhelmed with a load of hard words and phraſes; or if there have been any attempts to unbind theſe fetters, they have not been ſuch as are adapted to make Botany ſo general a ſtudy as it merits; or at leaſt to lead by the hand thoſe who, untinctured with literature, wiſh however to acquire ſome reaſonable knowledge of that vegetable nature around them, from which they reap ſuch a variety of pleaſure, with ſo much ſolid advantage.

What books can you recommend, that

may enable me to acquire a competent knowledge of Botany? is a queſtion that has very frequently been aſked me. To the learned I can readily anſwer, the works of Linnæus alone will furniſh you with all the knowledge you have occaſion for, or if they are deficient in any point, will refer you to other authors, where you may have every ſatisfaction that books can give you (*c*). But I am not very ſollicitous to relieve theſe learned gentlemen from their embarraſſment; they have reſources enough, and know how to help themſelves. As to the unlearned, if I were to ſend them to the tranſlations of Linnæus's works, they would only find themſelves bewildered in an inextricable labyrinth of unintelligible terms, and would only reap diſguſt from a ſtudy that is perhaps more capable of affording pleaſure than any other. If I were to bid

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(*c*) Theſe writings of Linnæus are—*Philoſophia Botanica*, that inexhauſtible mine of elementary knowledge —*Genera Plantarum*—*Species Plantarum*—and *Syſtema Vegetabilium*, which is an epitome of the two laſt.

them ſit down, and ſtudy their grammar (*d*) regularly; ſo dry and forbidding an outſet might diſcourage the greater number; and few would enter the temple through a veſtibule of ſo unpromiſing an appearance. A language however muſt be acquired; but then it may be done gradually; and the *tædium* of it may in ſome meaſure be relieved by carrying on at the ſame time a ſtudy of facts, and the philoſophy of nature. This ſeems to have been Rouſſeau's idea, and I have endeavoured not to loſe ſight of it, in my continuation of his eight ingenious letters.

Let an unlearned perſon then who is deſirous of acquiring ſome knowledge of Botany, begin by taking a few plants with flowers, whoſe parts are ſufficiently viſible, and examine them patiently by the deſcriptions and characters which are given in the following pages. You may perhaps know ſome plants by their names; or if not, you

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(*d*) In Lee's Introduction—Roſe's Elements, &c.

will be unfortunate indeed if you have not a friend who will ſhow you the flower of a lily. If in the courſe of your examination, any term ſhould occur, that is not explained in the page, or mentioned in the Index, you may have recourſe to the Dictionary, the Introduction, or the Elements. If you can have patience to go through the firſt ſeven letters, with a plant or two of each natural tribe explained in them; to make yourſelf maſter of the claſſification in the ninth and tenth; and to examine the obvious plants, whoſe characters are given in the twenty following letters, as they occur; I flatter myſelf that you will find little difficulty after that, in determining any plant which you ſhall happen to meet with, by Linnæus's characters, as delivered by his tranſlators (*e*): whereas if you had begun with them, I am confident you would have been diſcouraged from proceeding.

(*e*) A ſyſtem of vegetables, &c. tranſlated from the 13th edition of Linnæus's Syſtema Vegetabilium, by a Botanical Society at Lichfield.

Good plates, or figures of plants, will alſo be of conſiderable aſſiſtance: thoſe of Mr. Curtis's *Flora Londinenſis* will ſuffice for moſt of the Britiſh natives; eſpecially as he has accompanied his plates with ample and accurate deſcriptions in Engliſh as well as Latin. Mr. Miller's figures to his Gardener's Dictionary, exhibit a great number of the moſt remarkable foreigners. There is indeed no want of ſuch help (*f*): but the misfortune is, that theſe books are ſo very expenſive, as to be far beyond the purſe of all but the opulent.

I beg leave to proteſt againſt theſe letters being read in the eaſy chair at home; they

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(*f*) Cateſby's Carolina. Oeder's Flora Danica. Dillenius's Hortus Elthamenſis. Beſler's Hortus Eyſtettenſis. Rheede's Hortus Malabaricus. Rumphius's Herbarium Amboinenſe. Trew's Florum Imagines & Plantæ rariores. Jacquin's Obſervationes & Flora Auſtriaca. Ehret's Plantæ rariores. Blackwell's Herbal. Hill's Vegetable Syſtem. Merian's Surinam and European Plants and Inſects. Pallas's Flora Roſſica, and Scopoli's Flora Inſubrica—are all very fine works, but coſt an immenſe ſum to purchaſe them.

can be of no uſe but to ſuch as have a plant in their hand, nor do they pretend to any thing more, than to initiate ſuch, as from their ignorance of the learned languages, are unable to profit by the works of the learned, in the firſt principles of vegetable nature. Botany is not to be learnt in the cloſet; you muſt go forth into the garden or the fields, and there become familiar with Nature herſelf; with that beauty, order, regularity, and inexhauſtible variety which is to be found in the ſtructure of vegetables; and that wonderful fitneſs to its end, which we perceive in every work of Creation, when our limited underſtandings, and partial obſervations give us a juſt view of it.

THE

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ERRATA.

ERRATA.

Page 9, Line laſt, *for* 1669 *read* 1667
—— 30, —— 19, *for* ompoſe *read* compoſe
—— —, —— 30, *for* ſaſtened *read* faſtened
—— 33, —— 31, *for* 272 *read* 276
—— —, —— 32, *for* 689 *read* 695
—— —, —— —, *for* 1200 *read* 1257
—— 171, —— 14, *for* walks *read* balks
—— 205, —— 28, *for* uncultivated *read* cultivated
—— 207, —— laſt, *for* Love-apples *read* Love-apple
—— 209, —— 13, *for* in colour *read* and colour
—— 220, —— 8, *for* as under *read* aſunder
—— 284, —— 31, *for* oberacea *read* oleracea
—— 322, —— 10, *for* Celſus *read* Celſius
—— 330, —— 21, *for* character *read* characters
—— 362, —— 3, *for* axilliary *read* axillary
—— 395, —— 8, *for* furniſhes *read* furniſh
—— 417, —— 8, *for* chops *read* chaps

INTRODUCTION.

THE principal misfortune of Botany is, that from its very birth it has been looked upon merely as a part of medicine. This was the reaſon why every body was employed in finding, or ſuppoſing virtues in plants, whilſt the knowledge of plants themſelves was totally neglected; for how could the ſame man make ſuch long and repeated excurſions as ſo extenſive a ſtudy demands; and at the ſame time apply himſelf to the ſedentary labours both of the Laboratory, and attendance upon the ſick; which are the only methods of aſcertaining the nature of vegetable ſubſtances, and their effects upon the human body. This falſe idea of Botany, for a long time, almoſt confined the ſtudy of it to medicinal plants, and reduced the vegetable chain to a ſmall number of interrupted links. Even theſe were very ill ſtudied, becauſe the ſubſtance only was attended to, and not the organization. How indeed could they be much intereſted in the organical ſtructure of a ſubſtance, of which they had no other idea but as a thing to be pounded in a mortar?

tar? Plants were ſearched for, only to find remedies; it was ſimples, not plants that were looked after. This was very right, it will be ſaid; may be ſo. Hence nevertheleſs it follows, that if they were ever ſo well acquainted with remedies, they were very ignorant of plants; and this is all that I have here advanced.

Botany was nothing, there was no ſuch ſtudy, and they who plumed themſelves moſt upon their knowledge of plants, had no idea of their ſtructure, or of the vegetable œconomy. Every body knew by ſight five or ſix plants in his neighbourhood, to which he gave names at random, enriched with wonderful virtues, which he took it in his head they poſſeſſed, and each of theſe plants, changed into an univerſal panacea, was alone ſufficient to render all mankind immortal. Theſe plants transformed into balſams and ointments quickly diſappeared; and ſoon made room for others, to which new comers, in order to diſtinguiſh themſelves, attributed the ſame effects. Sometimes it was a new plant, decorated with ancient virtues, ſometimes old plants under new names, ſufficed to enrich new quacks. Theſe plants had a different vulgar name in every province, and they who pointed them out for their drugs, at moſt gave them only thoſe names, by which they were known on the ſpot where they lived; thus when their recipes travelled into other countries, it was no longer known what plant they ſpoke of; every body ſubſtituted another after his own fancy, without regarding any thing elſe, but giving it the ſame name. Such is the whole art that the Myrepſuſes, the Hildegardiſes, the Suardi, the Villanovæ and the reſt of the Doctors of that time employed in the ſtudy of thoſe plants which they treat of, and it would be difficult perhaps for any body to know one of them by the names or deſcriptions which they have given them (*a*).

At the revival of learning every thing diſappeared to make room for the works of antiquity; nothing was then either good or true but what was to be found in Ariſtotle or Galen. Inſtead of ſearching for plants where they grew, they ſtudied them only in Pliny and Dioſcorides, and there is nothing ſo frequent in the authors of thoſe times, as to find them denying the exiſtence of a plant, for no other reaſon, but becauſe Dioſcorides has not mentioned it. Theſe learned plants however muſt be found in nature, in order to

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(*a*) Myrepſus's Book is entitled *Antidotarium parvum.* Hildegardis was a Lady and an Abbeſs; ſhe flouriſhed about 1180, and writ among others a treatiſe entitled *Phyſica Leguminum*, *Fructuum*, *Herbarum*, &c. Suardus's Book is entitled *Antidotarium*, and was printed at Venice 1551 fol.—Arnoldus de Villanova put together *Regimen Sanitatis Salerni*, printed in 1482, 1484, 1490, 1491, 1493, 1505, 1509, &c. and was author of many other Medical and Medico-Botanical Works. He is ſaid to have died in 1313.

make uſe of them according to the precepts of their maſter. They beſtirred themſelves therefore, they ſet themſelves to ſearch, to obſerve, to conjecture; and made every effort to find, in the plant which they choſe, the characters deſcribed in their author; and ſince tranſlators, commentators and practitioners ſeldom agreed in their choice, twenty names were given to the ſame plant; and the ſame name to twenty plants; every man maintaining that his own was the true one, and that all the reſt, not being that of Dioſcorides, ought to be proſcribed. From this conflict indeed it followed at length that more careful reſearches were made, and ſome good obſervations, which deſerved not to be forgotten; but at the ſame time ſuch a chaos of *nomenclature*, that the Phyſicians and Herboriſts no longer underſtood each other: there was no poſſibility of communicating their mutual lights, nothing remained but diſputes of words and names, and even every uſeful enquiry and deſcription was loſt, for want of being able to decide what plant each author had ſpoken of.

Real Botaniſts however began to be formed, ſuch as Cluſius, Cordus, Cæſalpinus, Geſner (*b*); good and inſtructive books on this ſubject

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(*b*) If we follow the order of birth, the arrangement ſhould have been, Cordus 1515, Geſner 1516, Cæſalpinus 1519, Cluſius 1526: if we range them from the dates of ſubject began to be publiſhed, in which already appeared ſome traces of method (*c*). And it has certainly been a loſs that theſe pieces have become uſeleſs and unintelligible by the mere diſcordance of names (*d*). But theſe authors beginning to unite ſpecies and ſeparate genera, according to their own manner of obſerving the habit and apparent ſtructure, occaſioned new inconveniencies, and a freſh obſcurity; becauſe each author regulating his nomenclature by his own method, created new genera, or ſeparated old ones, as the characters of his own required. So that genera and ſpecies were ſo jumbled together,

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of their publications, they ſhould ſtand thus—Cordus 1535, Gèſner 1540, Cluſius 1557, Cæſalpinus 1583. But Rouſſeau learnt his Botany from the French, and Cluſius was a Frenchman.

(*c*) Indeed! ſome traces of method only, in the celebrated work of Cæſalpinus! He who firſt invented a complete arrangement of plants, and ſtands unrivalled as the Father of Method! He to whom every ſucceeding Syſtem-monger owes ſo many obligations! Though among them all Ray alone confeſſes it. What Rouſſeau affirms is true only of the excellent, the illuſtrious Geſner. The other two thought nothing of arrangement; No, nor the Bauhins, nor any other 'till Moriſon and Ray.

(*d*) If Rouſſeau means to ſpeak here concerning the works of the forementioned authors, this is not true. The treatiſes of Geſner and Cluſius are every where referred to even by Linnæus, and conſequently their nomenclature is well known. The principal work of Valerius Cordus is Geſner's Hiſtory of Plants, which he publiſhed in 1561. Cæſalpinus's book is now become rather a matter of reſpectable curioſity than uſe.

as to leave ſcarcely any plant without as many names as authors that deſcribed it; which made the ſtudy of the nomenclature as tedious, and often more difficult than that of the plants themſelves.

At length the two illuſtrious brothers appeared, who alone have done more for the advancement of Botany than all the reſt together who preceded them, and even followed them 'till Tournefort. Rare Geniuſes! whoſe vaſt knowledge and ſolid labours conſecrated to Botany, render them worthy of that immortality which they have acquired. For 'till this part of natural hiſtory falls into oblivion, the names of John and Caſpar Bauhin will live along with it in the memory of mankind (*e*).

Each of theſe men undertook an univerſal hiſtory of plants, but what more immediately relates to our preſent purpoſe is, that they each of them undertook to join to it a *Synonymy*, or exact liſt of the names that every plant bore in all the writers which preceded them. This labour was become abſolutely neceſſary to enable us to reap any advantage of their obſervations; for without that it was almoſt impoſſible to follow and diſtinguiſh every plant among ſo many names.

(*e*) John the elder was born at Lion in 1541, and died in 1613. Caſpar was not born 'till 1560, and died in 1624.

The eldeſt in a manner executed this undertaking in three volumes in folio, printed after his death; and he has given ſuch juſt deſcriptions of the plants, that we are rarely deceived in his ſynonyms (*f*).

The brother's plan was yet more extenſive, as appears by the firſt volume which he publiſhed, and from which we may judge of the immenſity of the whole work, if he had found time to execute it (*g*); but excepting this volume we have no more than the titles of the reſt in his pinax (*h*), and this pinax, the produce of forty years labour, is ſtill the guide to all thoſe who ſtudy this ſubject, and wiſh to conſult ancient authors (*i*).

The

(*f*) Chabræus was the editor, and Francis Louis de Graffenried, of Bern, was at the expence of the publication. This work derives no excellence from the paper or print. The plates are ſmall and poorly executed; they belonged to Fuchſius, and were purchaſed by the bookſeller for this purpoſe: the editor has not unfrequently put them in wrong places. John Bauhin's Hiſtory however has great intrinſic excellence, for the great number of plants well deſcribed, and a judicious compilation of whatever had been done before his time. It is entitled "Hiſtoria Plantarum Univerſalis Auctore Johanne Bauhino Archiatro, &c. Ebrod. 1651."

(*g*) Theatri Botanici pars I. Baſil. 1658 and 1663, fol.

(*h*) Pinax Theatri Botanici ſeu index in Theophraſti, Dioſcoridis, Plinii & botanicorum, qui a ſeculo ſcripſerant, opera, plantarum fere 6000 nomina cum ſynonymiis & differentiis. Opus XL annorum Baſil. 1623 & 1671. 4to.

(*i*) The judicious, the indefatigable Haller, from whoſe

The nomenclature of the Bauhins being formed only from the titles of their chapters, and theſe titles uſually compriſing ſeveral words, hence came the cuſtom of giving as the names of plants nothing but long ambiguous phraſes, which made this nomenclature not only tedious and embarraſſing, but pedantic and ridiculous. I own there might have been ſome advantage in this, provided their phraſes had been better conſtructed; but being compoſed indifferently of the names of places whence the plants came, of perſons who ſent them, and even of other plants to which they fancied them to bear ſome ſimilitude, theſe phraſes were ſources of new embarraſſment and freſh doubts, becauſe the knowledge of one plant required that of ſeveral others to which the phraſe referred,

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whoſe judgment there lies no appeal, ſays of Caſpar Bauhin, that he emulated his elder brother in Botany, that he was laborious in collecting, and knew a greater number of plants, being more enriched with them by his ſcholars and friends, but that his judgment was leſs acute, that he admitted too many varieties for ſpecies, that he has repeated the ſame plant under different names, that he was leſs accurate than his brother in his deſcriptions, leſs acquainted with the natural claſſes, and unfortunate, as well as himſelf, in being obliged to divide his time between Anatomy and Botany. Bibl. Botan. I. p. 384.

Haller ſays alſo of this *par nobile fratrum*, that for their unwearied diligence, they well deſerved to lead the way in a new age of Botany; and accordingly he puts them at the head of the *Collectores* in his ſixth book.

referred, and whoſe names were not better determined than its own.

In the mean time diſtant voyages were inceſſantly enriching Botany with new treaſures, and whilſt the old names already overloaded the memory, it was neceſſary to invent new ones inceſſantly for the new plants that were diſcovered. Loſt in this immenſe labyrinth, the Botaniſts were obliged to ſeek a thread to extricate themſelves from it, they attached themſelves therefore at laſt ſeriouſly to method; Herman, Rivinus, Ray (*k*), ſeverally propoſed their own; but the immortal Tournefort carried away the prize from them all (*l*); he firſt ranged the whole vegetable kingdom ſyſtematically (*m*); and reforming the

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(*k*) The order ſhould have been Ray, Herman, Rivinus. Ray publiſhed his firſt work in 1660, and his method in 1682*. Herman began to write in 1687, and printed his method in 1690. Rivinus publiſhed the firſt part of his method in 1690. Moriſon had before publiſhed his in 1669; and comes next after Cæſalpinus. A great chaſm between 1583 and 1669; and the ſcholar far inferior to the maſter.

(*l*) Tournefort firſt publiſhed his ſyſtem in 1697: it was ſpecious, and generally faſhionable, 'till Linnæus's ſuperſeded it.

(*m*) How far this is true may be ſeen in note *k*. Tournefort's however may be ſaid to have been the firſt complete regular arrangement; though how it could ever be uſed to good purpoſe, without any characters or deſcriptions of the ſpecies, I do not underſtand. Ray's method, when

* Ray however drew up tables for Biſhop Wilkins in 1669.

the nomenclature in part, combined it by his new genera with that of Caſpar Bauhin. But far from freeing it of its long phraſes, he either added new ones, or loaded the old ones with additions which his method obliged him to make. The barbarous cuſtom was then introduced of tagging new names to the old ones by a contradictory *qui quæ quod*, making of the ſame plant two diſtinct genera.

For inſtance—'Dens Leonis *qui* Piloſella 'folio minus villoſo. Doria *quæ* Jacobœa 'orientalis limonii folio. Titanokeratophy'ton *quod* Lithophyton marinum albicans?'

Thus was the nomenclature loaded. The names of the plants became not only phraſes but periods. I ſhall cite one of Plukenet's to prove that I do not exaggerate. "Gramen "myloicophorum carolinianum ſeu gramen "altiſſimum, panicula maxima ſpecioſa, e "ſpicis majoribus compreſſiuſculis utrinque "pinnatis blattam molendariam quodam

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when it had received his laſt hand, was far ſuperior, in my opinion, to Tournefort's.

Rouſſeau's opinion of Tournefort in compariſon with Linnæus, may be obſerved from the following extract of a letter of his to M. Dutens; in his works, tome XIV. p. 85.

"I cannot quite agree with you that Tournefort is "the greateſt Botaniſt of the age: he has the glory of "having firſt made Botany a methodical ſtudy: but even "after him it ſtill continued to be the ſtudy of an Apo"thecary. It was reſerved for the illuſtrious Linnæus "to render it a philoſophical ſcience."

" modo referentibus, compoſita, foliis con-" volutis mucronatis pungentibus." *Almag.* 137(*n*).

It would have been all over with Botany, if this practice had continued; the nomenclature being now abſolutely inſupportable, could no longer ſubſiſt in this ſtate, and it was become neceſſary either that a reformation ſhould be made, or that the richeſt, the moſt lovely, and the eaſieſt of the three parts of Natural Hiſtory ſhould be abandoned.

At length Linnæus, full of his ſyſtem, and the vaſt ideas which it ſuggeſted to him, formed the project of new-moulding the whole; a taſk which every body felt the neceſſity of, but no one dared to undertake. He did more, he executed it, and having prepared in his *Critica Botanica* the rules by which it ought to be conducted; he determined the genera of plants in his *Genera Plantarum*, and afterwards the ſpecies in his *Species Plantarum*(*o*): in ſuch a manner, that by keeping all the old names that agreed with theſe new rules, and new caſting all the reſt, he eſtabliſhed at length a clear nomenclature, founded upon the true principles of the art which

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(*n*) See Linnæus's Critica, and Philoſophia Botanica.

(*o*) The firſt ſketch of Linnæus's ſyſtem was publiſhed in 1735; the laſt edition of Syſtema Vegetabilium in 1784: the Critica Botanica in 1737: the firſt edition of the Genera the ſame year, and the laſt in 1764: the firſt edition of the Species in 1753, the ſecond in 1762 and 1763. See Dr. Pulteney's excellent account of the writings of Linnæus.

which he had ſet forth. He preſerved all the ancient genera which were truly natural, he corrected, ſimplified, united or divided the reſt as their true characters required. And in forming his names, he followed, ſometimes even ſomewhat too ſeverely, the rules which he had laid down.

With reſpect to the ſpecies, deſcriptions and diſtinctions were neceſſary to determine them; phraſes therefore remained always indiſpenſable, but by confining himſelf to a ſmall number of technical words, well choſen and well adapted, he made good ſhort definitions deduced from the true character of the plant, baniſhing rigorouſly all that was foreign to it. For this it was neceſſary to create a new language for Botany, that would ſpare the long periphraſes of the old deſcriptions. Complaint has been made that the words of this language are not all to be found in Cicero. This complaint would be reaſonable, had Cicero writ a complete treatiſe of Botany. Thoſe words however are all either Greek or Latin, expreſſive, ſhort, ſonorous, and even form elegant conſtructions by their extreme preciſion. It is in the conſtant practice of the art, that we feel all the advantage of this new language, which is as convenient and neceſſary for Botaniſts as that of Algebra is to Mathematicians (*p*).

(*p*) I hope this will ſerve as a ſatisfactory anſwer to all thoſe who talk of the barbarous language of Linnæus.

Hitherto Linnæus had indeed determined the greateſt part of known plants, but he had not named them; for defining a thing is not naming it; a phraſe can never be a true name, nor can it come into common uſe. He provided againſt this defect by the invention of trivial names (*q*), which he joined to the generical ones in order to diſtinguiſh the ſpecies. By this contrivance the name of every plant is compoſed only of two words, which alone, when choſen with diſcernment, and applied with propriety, often make the plant better known, than the long phraſes of Micheli and Plukenet. To be ſtill better and more regularly acquainted with it, there is the phraſe, which doubtleſs muſt be known, but need not be repeated every time we have occaſion to ſpeak of the object.

Nothing is more pedantic or ridiculous, when a woman, or one of thoſe men who reſemble women, are aſking you the name of an herb or a flower in a garden, than to be under the neceſſity of anſwering by a long file of latin words that have the appearance of a magical incantation; an inconvenience ſufficient to deter ſuch frivolous perſons from a charming ſtudy offered with ſo pedantic an apparatus (*r*).

However

(*q*) Theſe ſpecific or trivial names appear firſt in the *Pan Suecicus* of 1749, but they were brought to perfection in the firſt edition of the *Species Plantarum*, publiſhed four years after.

(*r*) Accordingly I can remember when nothing was ſo ridiculous

However neceſſary or advantageous this reform might be, nothing leſs was wanting than Linnæus's profound knowledge to execute it with ſucceſs, and the reputation of this great naturaliſt to make it be univerſally adopted. It met with reſiſtance at firſt, and meets with it ſtill. This could not be otherwiſe, his rivals in the ſame career look upon this adoption as a confeſſion of inferiority which they do not like to make; his nomenclature ſeemed ſo much of a piece with his ſyſtem, as that they could not well be ſeparated. And Botaniſts of the higher order, who think themſelves obliged through pride not to adopt the ſyſtem of any other, but each man to have his own, will not ſacrifice their pretenſions to the progreſs of an art for which the profeſſors have rarely a diſintereſted fondneſs.

National jealouſies alſo oppoſe the admiſſion of a foreign ſyſtem. People think themſelves obliged to ſupport the famous men of their own country, eſpecially after their death; for even that ſelf-love which made them ſcarcely bear their ſuperiority whilſt they were alive, is honoured by their glory after they are departed (*s*).

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ridiculous with ſuch perſons as the ſpecific enunciations or characters of Linnæus, whilſt theſe were ſuppoſed to be the names of the ſpecies, and the trivial names were not yet well underſtood.

(*s*) Linnæus's ſyſtem was received very ſoon in England, though we were in poſſeſſion of the beſt. Some

other

The great convenience however of this new nomenclature, and the utility of it which practice has made known, have cauſed it to be adopted almoſt univerſally throughout Europe ſooner or later, and even at Paris M. de Juſſieu has eſtabliſhed it in the royal garden; thus preferring the public utility to the glory of new-moulding the whole, which the method of natural families, invented by his illuſtrious uncle, ſeemed to require*. Not that the nomenclature of Linnæus is without its faults, or gives no handle to criticiſm; but 'till a more perfect one ſhall be found, in which nothing is wanting, it is far better to adopt this than to have none, or to fall again into the phraſes of Tournefort or Caſpar Bauhin. I can even ſcarcely believe that a better nomenclature will in future have ſucceſs enough to proſcribe this, to which the Botaniſts of Europe are at preſent ſo wholly accuſtomed, and having now the double tie of habit and convenience, they will renounce it with ſtill more unwillingneſs than they found in adopting it. In order to bring about ſuch a change, an author muſt be found with credit enough to efface that of Linnæus, one to whoſe authority all Europe would be willing a ſecond time to ſubmit, which appears

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other countries of Europe, but eſpecially France reſiſted it long, 'till at length they were forced into it, by its ſuperior excellence.

* The royal garden however is certainly arranged by M. Juſſieu's natural method.

to me not likely to happen. For if his ſyſtem (*t*), however excellent it may be, ſhould be adopted by one nation only, it would throw Botany into a new labyrinth, and do it more injury than ſervice.

Even the labour of Linnæus, though immenſe, remains ſtill imperfect, in as much as it does not comprehend all known plants, and is not adopted by all Botaniſts without exception: for the writings of ſuch as do not ſubmit to it, require from their readers, the ſame labour to ſettle the ſynonyms, as they were forced to take for thoſe which preceded it.

We are obliged to Mr. Crantz, notwithſtanding his rage againſt Linnæus, for having adopted his Nomenclature, though he rejected his ſyſtem. But Haller in his large and excellent work on the Swiſs plants (*u*), rejects both, and Adanſon does more, for he makes an entire new nomenclature, and furniſhes no information whereby we may refer it to Linnæus's. Haller always quotes the

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(*t*) He ſhould rather have ſaid *Nomenclature* or *Language*. It is of no great importance what ſyſtem we adopt, ſo that we all agree to talk the ſame Language. That of Linnæus will probably ſtand the teſt of ages, whatever may become of the Sexual Syſtem.

(*u*) Alberti v. Haller Hiſtoria Stirpium Indigenarum Helvetiæ inchoata. Bernæ 1768 folio, in three volumes. Though the illuſtrious author never could prevail on himſelf to adopt the trivial names, yet he has almoſt conſtantly given Linnæus's enunciations, and referred to his ſpecies.

genus, and frequently the ſpecific characters of Linnæus, but Adanſon never quotes either. Haller attaches himſelf to an exact ſynonymy, by which, even when he does not add Linnæus's enunciation of the ſpecies, we may find it at leaſt indirectly by the relation of the ſynonyms. But Linnæus and his books are abſolutely null and void for M. Adanſon and his readers, becauſe the latter gives no information whereby we may connect them (*v*). So that we are compelled to chooſe between Linnæus and M. Adanſon who excludes him without mercy, and throw all the works of one of them into the fire. Or elſe we muſt undertake a new work, which will be neither ſhort nor eaſy, to connect theſe nomenclatures, which offer us no point of union.

Linnæus indeed has not given a complete ſynonymy. For Plants known long ſince, he has contented himſelf with quoting the Bauhins and Cluſius, with a figure of each plant. For exotic plants lately diſcovered, he has cited one or two modern authors and the figures of Rheed, Rumphius and ſome others, and has gone no farther. His undertaking did not require of him a more extended compilation, and it is ſufficient that he has given one certain informa-

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(*v*) Thus M. Adanſon has precluded his Syſtem from coming into general uſe.

tion with regard to every plant which he names (*w*).

Such is the preſent ſtate of things. Now after this account of it, I would aſk every reader of common ſenſe, how it is poſſible to attach oneſelf to the ſtudy of plants, and at the ſame time to reject that of the nomenclature? It is juſt as if a man would make himſelf ſkilful in a language, with a determination not to learn the words of it. The names, 'tis true, are arbitrary, the knowledge of plants has no neceſſary connection with the nomenclature, and it is eaſy to conceive that an intelligent man might be an excellent Botaniſt, without knowing a ſingle plant by its name. But that one man alone, without books or any aſſiſtance from communicated information, ſhould become of himſelf a very moderate Botaniſt, is a ridiculous aſſertion to make, and an enterprize impoſſible to execute. The queſtion is, whether three hundred years of ſtudy and obſervation ſhould be loſt to Botany, whether three hundred volumes of figures and deſcriptions ſhould be thrown into the fire, whether the knowledge acquired by all the learned, who have conſecrated their purſe,

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(*w*) Rouſſeau means to ſpeak here of the *Species Plantarum*, and what he ſays is in general true of that. But in his *Flora Lapponica*, *Suecica*, &c. he has given a much more extenſive ſynonomy.

their life, their time, to diſtant, expenſive, painful and dangerous expeditions, ſhould be uſeleſs to their ſucceſſors, and whether every one ſetting out from nothing, could arrive by himſelf to the ſame knowledge, that a long ſeries of enquiry and ſtudy has ſpread over the maſs of mankind (*x*)? If not, and the moſt lovely part of Natural Hiſtory merits the attention of the curious, let them tell me, how we ſhall manage, to make uſe of the knowledge heretofore acquired, if we do not begin by learning the language of the writers, and knowing to what objects the names employed by them belong. To admit therefore the ſtudy of botany, and to reject that of the nomenclature, is a moſt abſurd contradiction.

(*x*) I would recommend this to the ſerious conſideration not only of Naturaliſts, but of all thoſe ſupercilious perſons, in whatever ſtudy or purſuit they may be engaged, who contemn the efforts of their predeceſſors, after they have profited by them all they can; and who talk of burning every book but their own, after they have fed upon them, and ſucked their very vitals. For my own part, when I ſee ſuch faſtidious and ungrateful fops in ſcience, I can think of nothing but the dwarf mounted on the ſhoulders of the giant; and the fly on the chariot wheel.

LETTERS
ON THE
ELEMENTS
OF
BOTANY.
To a LADY.

LETTER I.

Dated the 22nd of Auguſt, 1771.

I THINK your idea of amuſing the vivacity of your daughter a little, and exerciſing her attention upon ſuch agreeable and varied objects as plants, is excellent; though I ſhould not have ventured to play the pedant ſo far as to propoſe it of myſelf. Since however it comes from you, I approve it with all my heart, and will even aſſiſt you in it, convinced that at all times of life, the ſtudy of nature abates the taſte for frivolous amuſements, prevents the tumult of the paſſions, and provides the mind with a nouriſhment which is ſalutary, by filling it with an object moſt worthy of its contemplations.

You have begun with teaching your daughter the names of the common plants which you have about you: this was the very thing you ſhould have done. The few plants which ſhe knows by ſight are ſo many points of compariſon for her to extend her knowledge: but they are not ſufficient. You deſire to have a little catalogue of the moſt common plants, with the marks by which they may be known. I find ſome difficulty in doing this for you: that is, in giving you theſe marks or characters in writing, after a manner that is clear, and at the ſame time not diffuſe. This ſeems impoſſible without uſing the language peculiar to the ſubject, and the terms of that language form a vocabulary apart, which you cannot underſtand, unleſs it is previouſly explained to you.

Beſides, merely to be acquainted with plants by ſight, and to know only their names, cannot but be too inſipid a ſtudy for a genius like yours, and it may be preſumed that your daughter would not be long amuſed with it. I propoſe that you ſhould have ſome preliminary notions of the vegetable ſtructure or organization of plants, in order that you may get ſome real information, though you were to take only a few ſteps, into the moſt beautiful, and the richeſt of the three kingdoms of nature. We have nothing therefore to do yet with the nomenclature, which is but the knowledge of a herbariſt. I have always thought it poſſible to be a very great Botaniſt without knowing ſo much as one plant by name; and without wiſhing to make your daughter a very great Botaniſt, I think nevertheleſs that it will always be uſeful to her to learn how to ſee, whatever ſhe looks at, well. Do not however be terrified at the undertaking. You will ſoon know that it is not a great one. There is nothing either complicated or difficult in what I have to propoſe to you. Nothing is required but to have patience to begin with the beginning. After that you may go on no farther than you chooſe.

We are now getting towards the latter ſeaſon, and thoſe plants which are the moſt ſimple in their ſtructure are already paſt. Beſides, I expect you will take ſome time to make your obſervations a little regularly. However in the mean while, 'till Spring puts you in a ſituation to begin and follow the order of nature, I am going to give you a few words of the vocabulary to get by heart.

A perfect plant is compoſed of a root, of a ſtem with its branches, of leaves, flower, and fruit, (for in Botany, by fruit, in herbs as well as in trees, we underſtand the whole fabrick of the ſeed). You know the whole of this already, at leaſt enough to underſtand the term; but there is a principal part which requires an examination more at large; I mean the *fructification,* that is, the *flower* and the *fruit*. Let us begin with the flower, which comes firſt. In this part nature has incloſed the ſummary of her work; by this ſhe perpetuates it, and this alſo is commonly the moſt brilliant of all parts of the vegetable, and always leaſt liable to variations.

Take a Lily (*a*). I believe you will eaſily find it ſtill in full flower. Before it opens you ſee at the top of the ſtem an oblong greeniſh bud, which grows whiter the nearer it is to opening; and when it is quite open, you perceive that the white cover takes the form of a baſin or vaſe divided into ſeveral ſegments. This is called the *Corol*, and not the flower, as it is by the vulgar, becauſe the flower is a compoſition of ſeveral parts, of which the corol is only the principal.

The corol of the Lily is not of one piece, as you eaſily ſee. When it withers and falls, it ſeparates into ſix diſtinct pieces, which are called *petals*. Thus the corol of the lily is compoſed of ſix petals. A corol, conſiſting of ſeveral pieces like this, is called a *polypetalous* corol. If it were all of one piece, like

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(*a*) *Lilium candidum* of Linnæus, or any of its congeners, or almoſt any of the tribe of theſe which are called *liliaceous* flowers, and are for the greater part eminently beautiful.

the bell-flower (*b*) or bind-weeds (*c*), it would be called *monopetalous*. But to return to our lily.

You will find exactly in the middle of the corol a ſort of little column riſing from the bottom and pointing directly upwards. This, taken in its whole, is called the *Piſtil* or *Pointal:* taken in its parts, it is divided into three; 1. the ſwoln baſe with three blunted angles, called the *Germ* or *Ovary*; 2. a thread placed upon this, called the *Style*; 3. the ſtyle is crowned by a ſort of capital with three notches: this capital is called the *Stigma*.

Between the piſtil and the corol you find ſix other bodies entirely ſeparate from each other, which are called the *Stamens*. Each ſtamen is compoſed of two parts, one, long and thin, by which it is faſtened to the bottom of the corol, and called the *filament*; the other thicker, placed at the top of the filament, and called *Anther* (*d*). Each anther is a box which opens when it is ripe, and throws out a yellow duſt which has a ſtrong ſmell: this is called *Pollen* or *Farina*.

Such is the general analyſis of the parts which conſtitute a flower. As the corol

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(*b*) Campanula rotundifolia *Linnæi*.

(*c*) Convolvulus ſepium & arvenſis, &c. *Linnæi*.

(*d*) The old Engliſh name of anthera is *ſummit*, Grew called it *ſemet*.

fades

ſades and falls, the germ increaſes, and becomes an oblong triangular capſule, within which are flat ſeeds in three cells. This capſule, conſidered as the cover of the ſeeds, takes the name of *Pericarp*.

The parts here mentioned are found in the flowers of moſt other plants, but in different proportion, ſituation and number. By the analogy of theſe parts and their different combinations the families of the vegetable kingdom are determined. And theſe analogies are connected with others in thoſe parts of the plant which ſeem to have no relation to them. For inſtance, this number of ſix ſtamens, ſometimes only three, of ſix petals or diviſions of the corol, and that triangular form of the germ with its three cells, determine the liliaceous tribe; and in all this tribe, which is very numerous, the roots are *bulbs* of ſome ſort or other. That of the lily is *ſquamous*, or compoſed of ſcales; in the Aſphodel, it is a number of oblong ſolid bulbs connected together (*e*); in the Crocus and Saffron there are two bulbs, one over the other; in the Colchicum (*f*) they are placed ſide by ſide (*g*).

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(*e*) As in the Peony, Potatoe, &c. Theſe are called by ſome *tuberous* roots.

(*f*) Or Meadow Saffron.

(*g*) He might have added that ſome of theſe bulbs are ſolid like the turnep, others compoſed of coats one over another

The Lily, which I have choſen becauſe it is in ſeaſon, and alſo on account of the ſize of the flower and its other parts, is deficient however in one of the conſtituent parts of a perfect flower, namely the *calyx*, which is that outer green part of the flower uſually divided into five parts or compoſed of five ſmall leaves; ſuſtaining and embracing the corol at the bottom, and enveloping it entirely before it opens, as you may have remarked in the roſe. The calyx which accompanies almoſt all other flowers, is wanting in the greater part of the liliaceous tribe, as the tulip, the hyacinth, the narciſſus, the tuberoſe, &c. and even in the onion, leek, garlick, &c. which are alſo liliaceous, though they appear very different at firſt ſight. You will perceive alſo that in this whole tribe the ſtems are ſimple and unbranched, the leaves entire and never cut or divided; obſervations which confirm the analogy of the flower and fruit in this family, by that of the other parts of the plants. If you beſtow ſome attention upon theſe particulars, and make them familiar to you by frequent obſervations, you are already in a condition to determine, by an attentive and

another as in the onion. Linnæus does not allow them to be roots, and indeed it is only their being underground that led former Botaniſts to call them ſo. He names them *Hybernacula*, *winter gems* or *buds*, into which the whole plant retires during the cold ſeaſon.

continued

continued inſpection of a plant, whether it be of the liliaceous tribe or not, and this, without knowing the name of the plant (*h*). You ſee that this is not a mere labour of the memory, but a ſtudy of obſervations and facts, truly worthy of a Naturaliſt (*i*). You will not begin by telling your daughter all this at once, and ſtill leſs when in the ſequel you ſhall be initiated in the myſteries of vegetation; but you will unveil to her by degrees no more than is ſuitable to her age and ſex, by directing her how to find out things of herſelf, rather than by teaching her (*k*). Adieu, my dear couſin; if all this traſh is agreeable to you, I am at your ſervice.

(*h*) If it ſhould happen to be Spring when the reader takes up this letter, he may examine the ſnow-drop, crocus, daffodil, narciſſus, crown-imperial, tulip, lily of the valley, hyacinth, &c. always taking care in the garden to avoid double flowers. See Letter II.

(*i*) Botany is frequently, but we ſee here how unjuſtly, repreſented as a ſcience which depends wholly upon the memory, as if it were nothing but to get the names of ten thouſand plants by heart.

(*k*) Rouſſeau takes every occaſion to inculcate this fundamental leſſon of education; and indeed it cannot be inculcated too often. See Letter V.

LETTER II.

The 18th of October, 1771.

SINCE you underſtand ſo well, my dear Couſin, the firſt lineaments of plants, though ſo ſlightly marked, as to be able already to diſtinguiſh the liliaceous family by their air, and ſince our little Botaniſt amuſes herſelf with corols and petals, I am going to ſet before you another tribe, upon which ſhe may again exerciſe her little knowledge; with rather more difficulty I own, becauſe the flowers are much ſmaller, and the foliage more varied, but with the ſame pleaſure both on her ſide and on yours; at leaſt if you have as much delight in following this flowery path, as I find in tracing it out to you.

When the firſt rays of Spring ſhall have enlightened your progreſs, by ſhowing you in the gardens Hyacinths, Tulips, Narciſſuſes, Jonquils and Lilies of the Valley, the analyſis of all which is already known to you, other flowers will ſoon catch your attention, and require of you a new examination. Such are Stocks (*l*) and Rockets (*m*). Whenever you

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(*l*) Cheiranthus incanus Linniæi.

(*m*) Heſperis matronalis Linnæi.—Or if theſe are not at hand, Wall-flowers, Cabbage, Turnep, Cole-ſeed, Muſtard, Charlock, Radiſh, &c.

you find them double, don't meddle with them; they are diſfigured, or if you pleaſe, dreſſed after our faſhion, nature will no longer be found among them: ſhe refuſes to reproduce any thing from monſters thus mutilated; for if the moſt brilliant part of the flower, namely the corol, is multiplied, it is at the expence of the more eſſential parts, which diſappear under this addition of brilliancy.

Take then a ſingle ſtock-gilliflower, or ſtock, as it is vulgarly called, and proceed to the analyſis of the flower. You will perceive immediately an exterior part, which was wanting in the liliaceous flowers, namely the calyx. This conſiſts of four pieces, which we muſt call leaves, leaflets, or folioles, having no proper names to expreſs them by, as we have that of petals for the pieces which compoſe the corol. Theſe four pieces are commonly unequal by pairs, that is, there are two leaflets oppoſite and equal, of a ſmaller ſize; and two others alſo oppoſite and equal, but larger, eſpecially towards the bottom, where they are ſo rounded, as to exhibit a very ſenſible protuberance or bump on the outſide.

In this calyx you will find a corol compoſed of four petals. I ſay nothing of their colour, becauſe that makes no part of their character. Each of theſe petals is faſtened to the receptacle, or bottom of the calyx, by a narrow pale part, which is called *Unguis* or the *tail* of the petal, and this ſpreads out over the top of the calyx into a large, flat, coloured part, called *Lamina* or the *border* (*n*).

In the centre of the corol is one piſtil, long, cylindric, or nearly ſo; chiefly compoſed of a germ ending in a very ſhort ſtyle, and that terminated by an oblong ſtigma, which is *bifid*, that is to ſay, divided into two parts, which are reflected on each ſide.

If you examine carefully the reſpective poſition of the calyx and corol, you will ſee that each petal, inſtead of correſponding exactly to each leaflet of the calyx, is on the contrary placed between two; ſo that it anſwers to the opening which ſeparates them, and this alternate poſition has place in all flowers which have as many petals to the corol as leaflets to the calyx.

It remains now to ſpeak of the ſtamens. You will find ſix of them in the flower of the ſtock, as in the liliaceous flowers, but not all equal, or elſe alternately unequal, as in thoſe; but you will perceive two oppoſite to each other, ſenſibly ſhorter than the other four which ſeparate them, and which are alſo ſeparate from each other in pairs.

I ſhall not enter here into a detail of their

(*n*) I wonder that Rouſſeau ſays nothing of the regular ſtructure of this corol, the petals generally ſtanding wide from each other, and forming a figure ſomething like the croſs of the order of St. Louis, whence theſe Corols are called *Cruciform*, or *croſs-ſhaped.*

ſtructure and poſition: but I give you notice that if you look carefully, you will find the reaſon why theſe two ſtamens are ſhorter than the other four, and why two leaflets of the calyx are more protuberant, or as the Botaniſts ſpeak, more gibbous, and the other two more flatted.

To finiſh the hiſtory of our Stock, you muſt not abandon it as ſoon as you have analyſed the flower, but wait 'till the corol withers and falls, which it does pretty ſoon, and then remark what becomes of the piſtil, compoſed as we obſerved before of the germ, the ſtyle and the ſtigma. The germ grows conſiderably in length, and thickens a little as the fruit ripens. When it is ripe, it becomes a kind of flat pod called *Silique*.

This Silique is compoſed of two valves, each covering a ſmall cell; and the cells are ſeparated by a thin partition. When the ſeed is ripe, the valves open from the bottom upwards to give it paſſage, and remain faſt to the ſtigma at top. Then you may ſee the flat round ſeeds ranged along each ſide of the partition, and you will find that they are faſtened alternately to right and left by a ſhort pedicle to the ſutures or each edge of the partition.

I am very much afraid, my dear Couſin, that I have fatigued you a little with this long deſcription; but it was neceſſary to give you the eſſential character of the numerous tribe of *Cruciform* flowers (*o*), which forms an entire claſs in almoſt all the ſyſtems of Botaniſts; and I hope that this deſcription, which is difficult to underſtand here without a figure, will become more intelligible, when you ſhall have gone through it with ſome attention, having at the ſame time the object before your eyes.

The great number of ſpecies in this claſs(*p*) has determined Botaniſts to divide it into two ſections, in which the flowers are perfectly alike, but the fruits, pericarps, or ſeed-veſſels, are ſenſibly different.

The firſt order comprehends the Cruciform flowers with a Silique, or Pod, ſuch as the Stock, thoſe mentioned in note *m*, and the like.

The ſecond contains thoſe whoſe ſeed-veſſel is a *Silicle*, that is, a ſmall and very ſhort pod, almoſt as wide as it is long, and differently divided within; as Whitlow-graſs, Mithridate-Muſtard, Baſtard-Creſs, &c. in the fields; and Scurvy-graſs, Horſe-radiſh, Candy-tuft, Honeſty, &c. in the gardens: though the ſeed-veſſel of the laſt is very large, it is ſtill a ſilicle, becauſe the length exceeds the breadth very little. If none of theſe are known to you, I preſume at leaſt that you are acquainted with the

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(*o*) See note *n*.

(*p*) 272 Species. In the 17th Claſs, Diadelphia, or Two Brotherhoods 689, and in the 19th 1200 ſpecies.

Shepherd's-purſe, which is ſo common a weed in kitchen-gardens. Well then, Couſin, this Shepherd's-purſe is of the Cruciform tribe, and the *Silicle* branch of it, and the form of the Silicle is triangular (*q*). By this you may form ſome idea of the reſt 'till they fall into your hands.

But it is time to let you breathe; I will only therefore give you a hint at preſent that in this claſs, and many others, you will often find flowers much ſmaller than thoſe of the Stock, and ſometimes ſo ſmall that you cannot examine their parts without the aſſiſtance of a glaſs (*r*); an inſtrument which a Botaniſt cannot do without, any more than he can without a needle, a lancet or penknife, and a pair of good ſciſſars. Preſuming that your maternal zeal may carry you thus far, I fancy to myſelf a charming picture of my beautiful Couſin buſy with her glaſs examining heaps of flowers, a hundred times leſs flouriſhing, leſs freſh, and leſs agreeable than herſelf. Adieu dear Couſin 'till the next chapter.

(*q*) The young Botaniſt ſhould be advertiſed that theſe Silicles or little pods differ much in their form : ſome are flat, and round or oval ; others are ſpherical or ſpheroidal, and that of ſhepherd's-purſe has a form peculiar to itſelf.

(*r*) This of the ſmallneſs of the parts in many flowers is an objection that every idle novice makes to the Linnæan ſyſtem, ever trembling leſt any thorn or obſtacle, be it ever ſo minute, ſhould occur in the flowery path : the difficulty however will in great meaſure vaniſh, if he will but have patience to go regularly on his way.

LETTER III.

The 26th of May, 1772.

SINCE you continue, dear Couſin, to purſue with your daughter, that peaceable and delightful ſtudy, which fills up thoſe voids in our time that others dedicate to idleneſs or ſomething worſe, with intereſting obſervations on nature; I will reſume the interrupted thread of our vegetable tribes.

My intention is to deſcribe ſix of theſe tribes to you firſt, in order to render the general ſtructure of the characteriſtic parts of plants familiar. You have already had two of them; there are four remaining, which you muſt ſtill have the patience to go through, and after that, quitting for a time the other branches of that numerous race, and going on to examine the different parts of the fructification, we ſhall manage ſo, that without knowing many plants perhaps, you will at leaſt never be in a ſtrange country among the productions of the vegetable kingdom.

But I muſt inform you, that if you will take books in hand, and purſue the common nomenclature; with abundance of names, you will have few ideas; thoſe which you have will be confuſed; and you will not follow properly either my ſteps or thoſe of others; but will have at moſt a mere knowledge of words.

words. I am jealous, dear Couſin, of being your only guide in this part of Botany. When it is the proper time, I will point out to you the books that you may conſult. In the mean time have patience to read nothing but in that of nature; and to keep wholly to my letters.

Peas are at preſent in full fructification. Seize the moment to obſerve their characters. They are ſome of the moſt curious that Botany affords. One general diviſion of flowers is into regular and irregular. The firſt are they whoſe parts all ſpring uniformly from the centre of the flower, and terminate in the circumference of a circle. This uniformity is the reaſon why when we view flowers of this kind, we do not diſtinguiſh an under from an upper part, nor the right from the left; ſuch are the two tribes which we have already examined. But you will ſee at firſt ſight that the flower of a pea is irregular, that you eaſily diſtinguiſh the longer part of the corol, which ſhould be at top, from the ſhorter which ſhould be at bottom, and you know very well, when you hold up the flower to the eye, whether it is in its natural ſituation or not. Thus in examining an irregular flower, whenever we ſpeak of the top and the bottom, we ſuppoſe it to be in its natural ſituation.

The flowers of this tribe being of a very particular ſtructure, you muſt not only have ſeveral Pea flowers, and diſſect them ſucceſſively, to obſerve all their parts one after another; but you muſt alſo purſue the progreſs of the fructification from the firſt flowering, to the maturity of the fruit.

Firſt you will find a *monophyllous* calyx; that is, one of an entire piece, ending in five very diſtinct points, the two wider of which are at top, and three narrower at bottom. This calyx bends towards the lower part, as does alſo the peduncle, or little ſtalk which ſupports it: this peduncle is very ſmall and eaſily moveable, ſo that the flower readily avoids a current of air, and commonly turns its back to the wind and rain.

Having examined the calyx, you may pull it off, ſo as to leave the reſt of the flower entire, and then you will ſee plainly that the corol is polypetalous.

The firſt piece is a large wide petal covering the others, and occupying the upper part of the corol: it is called *Standard*, or *Banner*. We muſt make uſe neither of our eyes nor of common ſenſe, if we do not perceive that this petal is deſigned to protect the other parts of the flower, from the principal injuries of the weather. In taking off the ſtandard, you will obſerve, that it is inſerted on each ſide by a little proceſs into the ſide pieces, ſo that it cannot be driven out of its place by the wind.

The ſtandard being taken off, expoſes to view thoſe two ſide pieces, to which it adhered: they are called the *Wings*. In taking theſe off you will find them ſtill more ſtrongly inſerted into the remaining part, ſo that they cannot be ſeparated without ſome effort. Theſe wings are ſcarcely leſs uſeful in protecting the ſides of the flower than the ſtandard in covering it.

Taking off the wings you diſcover the laſt piece of the corol; this is that which covers and defends the centre of the flower, and wraps it up, eſpecially underneath, as carefully as the three other petals envelope the upper part and the ſides. This laſt piece, which on account of its form is called the *Boat* or *Keel*, is as it were the ſtrong-box, into which nature has put her treaſure, to keep it ſafe from the attacks of air and water.

When you have well examined this petal, draw it gently downwards, pinching it ſlightly by the keel or thin edge, for fear of tearing away what it contains. I am certain you will be pleaſed with the myſtery it reveals, when the veil is removed.

The young fruit involved in the boat or keel, is conſtructed in this manner. A cylindric membrane terminated by ten diſtinct threads ſurrounds the germ, or embryo of the legume or pod. Theſe ten threads are ſo many filaments, united below round the germ, and terminated each by a yellow anther,

ther, whoſe farina covers the ſtigma which terminates the ſtyle, or grows along the ſide of it; this ſtigma, though yellow with the meal which ſticks to it, is eaſily diſtinguiſhed by its figure and ſize. Thus do theſe ten filaments form alſo about the germ an interior armour, to preſerve it from exterior injuries.

If you examine more curiouſly, you will find that theſe ten filaments are united into one at the baſe, only in appearance (*r*). For in the upper part of this cylinder there is a piece or ſtamen which at firſt appears to adhere to the reſt, but as the flower fades and the fruit increaſes, ſeparates and leaves an opening at top, by which the fruit can extend itſelf, by opening and ſeparating the cylinder gradually; which otherwiſe, by compreſſing and ſtraitening it all round, would impede its growth. If the flower is not ſufficiently advanced, you will not find this ſtamen detached from the cylinder; but put a fine pin or needle into two little holes which you will ſee near the receptacle, at the baſe of that ſtamen, and you will ſoon perceive the ſtamen with its anther ſeparate from the nine others, which will continue always to form one body, till at length they fade and dry, when the germ becomes a

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(*r*) In many ſpecies however the cylinder is entire, and the ten filaments are really united into one.

Legume, and has no longer any occaſion for them.

This *Legume* is diſtinguiſhed from the *Silique* of the cruciform tribe, by the ſeeds being faſtened to one ſide only of the caſe, alternately indeed to each valve of it, but all of them to the ſame ſide. You will underſtand this diſtinction perfectly, if you open the pod of a pea and of a ſtock at the ſame time, taking care only to have them before they are quite ripe, that when the pericarp is opened, the ſeeds may continue faſtened by their proper ligaments, to their ſutures and their valves (*s*).

If I have made myſelf well underſtood, you will comprehend, dear Couſin, what aſtoniſhing precautions have been heaped together by nature, to bring the embryo of the pea to maturity, and above all to protect it, in the midſt of the greateſt rains, from that wet which is fatal to it, without incloſing it in a hard ſhell, which would have made it another kind of fruit. The Creator, attentive to the preſervation of all beings, has taken great care to protect the fructifica-

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(*s*) In doing this you will alſo perceive that the legume is unilocular, or has one cell only, whereas you remember that the Silique was ſaid to be bilocular. And if you take a ripe legume, you will find that it opens by the upper ſuture, oppoſite to that to which the ſeeds are faſtened, whereas the Silique opens from the bottom upwards by both ſutures.

tion of plants from attacks that may injure it; but he ſeems to have doubled his attention to thoſe which ſerve for the nouriſhment of man and animals, as does the greater part of the leguminous or pulſe tribe. The proviſion for the fructification of Peas is, in different proportions, the ſame through this claſs. The flowers have the name of *Papilionaceous*, from a fancied reſemblance of them to the form of a Butterfly *(Papilio)*; they have generally a *Standard* or *Banner*, two *Wings* and a *Boat* or *Keel*; that is, four irregular petals. But in ſome genera the boat is divided longitudinally into two pieces almoſt adhering by the keel, and theſe flowers have in reality five petals: others, as Clover (*t*), have all their petals united, and though papilionaceous, are however monopetalous flowers.

The papilionaceous or leguminous plants form one of the moſt numerous and uſeful tribes. Beans, Peas, Lucerne, Saintfoin, Clover, Lupins, Lentils, Tares or Vetches, Indigo, Liquorice, Kidney-beans, &c. all belong to it: the character of theſe laſt is to have the boat ſpirally twiſted, which at firſt might be taken for an accident. There are alſo ſome trees belonging to it; among others that which is commonly called Aca-

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(*t*) Trifolium pratenſe *Linnæi*.

cia, but which is not the true Acacia (*u*), and many beautiful flowering ſhrubs. But of theſe more hereafter. Adieu Couſin, I wiſh well to every thing that you love.

(*u*) Robinia Pſeudacacia *Linnæi*.

LETTER IV.

The 19th of June, 1772.

LET us talk of plants, my dear Couſin, whilſt the ſeaſon for obſerving them invites us. Your ſolution of my queſtion concerning the ſtamens of cruciform flowers is perfectly right, and ſhows that you have underſtood me, or rather attended to me; for you have nothing to do but to attend, in order to underſtand. You have accounted very well for the ſwelling of the two leaflets of the calyx, and the relative ſhortneſs of two of the ſtamens, in the ſtock, by the bending of theſe two ſtamens. One ſtep more would have led you to the primary cauſe of this ſtructure: for if you aſk once more why theſe ſtamens are thus bent, and conſequently ſhortened; I anſwer, that you will find a little gland upon the receptacle, between the ſtamen and the germ, and it is this gland which by throwing the ſtamen to a diſtance, and forcing it to take a round, neceſſarily ſhortens it. Upon the ſame receptacle are two other glands, one at the foot of each pair of longer ſtamens; but being on the outſide of them, between theſe ſtamens and the calyx, they do not oblige them to bend, and therefore do not ſhorten them: ſo that the two pair of ſtamens ſtand higher than the two ſingle bent ones, not becauſe they are longer, but becauſe they are ſtraight. Theſe four glands, or at leaſt veſtiges of them, are more or leſs viſible in almoſt all cruciform flowers, and are much more diſtinct in ſome than in the ſtock (*v*). If you aſk me what the glands are for? I anſwer, that they are one of thoſe inſtruments deſtined by nature to unite the vegetable to the animal kingdom, and to make them circulate from one to another. But laying theſe enquiries aſide, in which we anticipate a little too much, let us for the preſent return to our tribes of plants.

The flowers which I have hitherto deſcribed to you are polypetalous. I ought perhaps to have begun with the regular monopetalous flowers, which have a much more ſimple ſtructure, but it was this very ſimplicity which diſcouraged me. They conſtitute rather a great nation than a ſingle tribe; ſo that to comprehend them all under one common mark, we muſt employ characters ſo general and ſo vague, that whilſt we ſeem to ſay ſomething, in effect we ſcarcely ſay any thing. It is better to confine ourſelves within narrower bounds, which we can mark out with more preciſion.

Among the irregular monopetalous flowers,

(*v*) As in Arabis Turrita, Cabbage, Muſtard, Charlock, Radiſh, &c.

ers, there is a tribe, whoſe phyſiognomy is ſo marked, that we diſtinguiſh the members of it eaſily by their air. It is that to whoſe flowers Linnæus has given the name of *ringent*, becauſe they are cut into two lips, the opening of which, whether natural, or produced by a ſlight compreſſion of the fingers, gives them the air of a gaping mouth. This tribe is divided into two branches. One of *labiate* or ringent flowers properly ſo called, and the other of *perſonate* or maſked flowers: the Latin word *perſona* ſignifying a maſk. The character common to all the tribe, is not only a monopetalous corol, cut into two lips, the upper one called the *caſque* or *helmet*, the lower one the *beard*; but alſo four ſtamens, almoſt in the ſame row, diſtinguiſhed into two pairs, one longer, and the other ſhorter. The inſpection of the object itſelf will explain theſe characters better to you, than can be done in writing.

Let us begin with the labiate flowers. For an example I ſhould willingly give you Sage, which is common in almoſt all gardens. But the ſingular ſtructure of its ſtamens, which has occaſioned ſome Botaniſts to ſeparate it from the aſſociates, to which it naturally belongs, induces me to look for another inſtance (*w*) in the *White*

(*w*) Roſemary, with ſome few others, not ſo well known, muſt alſo be avoided, becauſe there are only two ſtamens to the flower.

Dead-nettle (*x*), which notwithſtanding its name has no affinity with Nettles properly ſo called, except in the ſhape of the leaves. This plant is ſo common every where, and continues ſo long in flower, that it cannot be difficult for you to find it (*y*). Without ſtopping here to conſider the elegant ſituation of the flowers (*z*), I will confine myſelf to their ſtructure. The white Dead-nettle bears a monopetalous labiate flower, with the caſque or upper lip arched in order to cover the reſt of the flower, and particularly the ſtamens, which keep all four of them very cloſe under cover of its roof. You will eaſily diſcern the longer pair and the ſhorter pair, and in the midſt of them the ſtyle, of the ſame colour, but diſtinguiſhed from them by being forked at the end, inſtead of bearing an anther like the ſtamens. The beard or lower lip bends back, and hangs down, ſo as to let you ſee the inſide of the corol almoſt to the bottom. In this genus the lower lip is divided lengthwiſe in the middle, but that is not general in this tribe.

(*x*) Lamium album Linnæi.

(*y*) The largeneſs of the flowers alſo makes it proper for examination; but if the ſmell ſhould be any objection, there is Ground-ivy, the other Lamiums, Betony, Horehound, Baum, Self-heal, Baum of Gilead, &c.

(*z*) Called Verticillate.

If you pull out the corol, you will take the ſtamens along with it, theſe being faſtened by the filaments to that, and not to the receptacle, whereon the piſtil only will remain. In examining how the ſtamens are faſtened in other flowers, we find them generally attached to the corol in monopetalous, and to the receptacle or calyx in polypetalous flowers: ſo that in the latter caſe, one may take away the petals without the ſtamens. From this obſervation we have an elegant, eaſy, and pretty certain rule, to know whether a corol conſiſts of one piece or ſeveral; when it is difficult, as it ſometimes is, to be certain of it immediately.

The corol when pulled off is open at bottom, becauſe it was faſtened to the receptacle, ſo as to leave a circular opening by which the piſtil and what ſurrounds it may grow up within the tube. That which ſurrounds the piſtil in this Dead-nettle, and all the labiate tribe, is the rudiment of the fruit, conſiſting of four embryos which become four ſeeds that are naked, that is, without any pericarp or covering; the monophyllous calyx divided into five ſegments ſerving this purpoſe, ſo that the ſeeds, when they are ripe, are detached and fall to the ground ſeparately. This is the character of the labiate flowers.

The other branch or ſection, which is that of the *perſonate* flowers, is diſtinguiſhed from the former, firſt in having the two lips not uſually open or gaping, but cloſed and joined (z), as you may ſee in the *Snapdragon* (*a*), a flower not uncommon in gardens, or for want of that in the *Toad-flax*, a yellow flower with a ſpur, ſo common in the country at this ſeaſon (*b*). But a more preciſe and certain character is, that inſtead of having four naked ſeeds at the bottom of the calyx, like the labiate flowers, theſe have a capſule or caſe incloſing the ſeeds, and not opening 'till they are ripe, in order to diſperſe them. To theſe characters we may add that the greater part of the labiate plants are either ſtrong-ſmelling and aromatic, as Marjoram, Thyme, Baſil, Mint, Hyſſop, Lavender, &c. or elſe ſtrong-ſmelling and ſtinking, as the Dead-nettles, Hedge-nettle, Cat-mint, black Horehound, (*c*) &c. ſome few only having little or no ſmell, as Bugle, Self-heal and hooded Willow-herb: whereas moſt of the plants with perſonate flowers are not odorous, as Snap-dragon, Toad-flax, Eye-bright, Louſewort, yellow Rattle, Broom-rape, ivy-leaved Toad-flax, round leaved Toad-flax, Fox-glove, &c. (*d*); I know of none that have a ſtrong ſmell in this branch but the Scrophularia or Figwort, which ſmells ſtrong, without being aromatic. Here I am not able to name any but ſuch plants as may perhaps be unknown to you, but you will gradually get acquainted with them, and whenever you ſee them, you will be able by yourſelf to determine what claſs they belong to. I wiſh you would try to determine the branch or ſection by its phyſiognomy, and that you would exerciſe yourſelf in judging at ſight, whether a flower is labiate or perſonate. The exterior form of the corol may ſuffice to guide you in this choice, which you may verify afterwards by pulling out the corol, and looking at the bottom of the calyx; for if you have judged right, the flower which you have named labiate will ſhow you four naked ſeeds, and that which you have named perſonate will ſhow you a pericarp: the contrary would prove that you was miſtaken, and by a ſecond examination of the ſame plant you would prevent a like miſtake another time *. Here, dear Couſin, is

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(z) There are too many exceptions to this to form a general character, if under the idea of perſonate flowers we include all the plants in the ſecond order of Linnæus's 14th claſs, as Rouſſeau ſeems to do.

(*a*) Antirrhinum majus Linnæi.

(*b*) Antirrhinum Linaria Linnæi.—It flowers later with us. Moſt of the perſonate tribe flower late.

(*c*) Here, and in ſome other places, I have taken the liberty of putting plants better known among us, inſtead of thoſe which Rouſſeau has given.

(*d*) Some of theſe have the mouth of the corol gaping.

* This advice will apply in all the other natural claſſes. From this paſſage it is clear that by labiate flowers,

is buſineſs cut out for ſeveral walks. I ſhall not fail to provide ſomething for thoſe that will ſucceed.

ers Rouſſeau underſtands all that are included in the firſt order; by perſonate flowers all that are in the ſecond order of Linnæus's 14th claſs: but many of the flowers in the ſecond order are labiate.

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LETTER V.

The 16th of July, 1772.

COMFORT yourſelf, my good Couſin, for not having detected the glands in the cruciform flowers. Great Botaniſts, and quick-ſighted ones too, have not been more happy. Tournefort himſelf makes no mention of them. They are very viſible in but few genera, though we find veſtiges of them in almoſt all; and it is by analyſing ſome of the cruciform flowers, and always obſerving inequalities in the receptacle, and then examining theſe inequalities, that we find out that theſe glands belong to moſt of the genera; and ſuppoſe therefore by analogy that they exiſt in the others, where we do not diſtinguiſh them.

I comprehend that you may not be pleaſed at taking ſo much pains, without knowing the names of the plants which you examine. But I own fairly, that it did not enter into my plan, to ſpare you that little chagrin. It is pretended that Botany is merely a ſcience of words, which only exerciſes the memory, and teaches the names of plants. For my part, I know not any reaſonable ſtudy, which is a mere ſcience of words; and to which of theſe ſhall we give the name of

Botaniſt, to him who has a name, or a phraſe ready, when he ſees a plant, but without knowing any thing of its ſtructure; or to him, who being well acquainted with this ſtructure, is ignorant nevertheleſs of the arbitrary name which the plant has, in this or that country? If we give our children nothing but an amuſing employment, we loſe the beſt half of our deſign, which is, at the ſame time that we amuſe them, to exerciſe their underſtandings, and to accuſtom them to attention. Before we teach them to name what they ſee, let us begin by teaching them how to ſee. This ſcience, which is forgot in all ſorts of education, ſhould make the moſt important part of it. I can never repeat it often enough, teach them not to pay themſelves in words, nor to think they know any thing of what is merely laid up in their memory.

However, not to play the rogue with you too much, I give you the names of ſome plants, with which you may eaſily verify my deſcriptions, by cauſing them to be ſhown you. For inſtance, if you cannot find a white Dead-nettle, when you are reading the analyſis of the labiate or ringent flowers; you have nothing to do but to ſend to an herboriſt for it freſh gathered, to apply my deſcription to the flower, and then having examined the other parts of the plant, in the manner which I ſhall hereafter point out, you will be infinitely better acquainted with the white Dead-nettle, than the herboriſt who furniſhed you with it, will ever be during his whole life (*e*); in a little time however we ſhall learn how to do without the herboriſt: but firſt we muſt finiſh the examination of our tribes; and now I come to the fifth, which at this time is in full fructification.

Figure to yourſelf a long ſtem pretty ſtraight, with leaves placed alternately upon it, generally cut fine, and embracing at the baſe branches which grow from their *alæ* (*f*). From the upper part of this ſtem as from a centre grow ſeveral pedicles or rays, which ſpreading circularly and regularly like the ribs of an umbrella, crown the ſtem with a kind of baſin more or leſs open (*g*). Sometimes theſe rays leave a ſort of void in the middle, and repreſent in that caſe more exactly the hollow of a baſin; ſometimes alſo this middle is furniſhed with other rays that are ſhorter, which riſing leſs obliquely form with

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(*e*) There are few perſons I preſume to whom this common plant is not well known: if otherwiſe, the common people are generally acquainted with it; though unfortunately the moſt vulgar plants having different names in different diſtricts, and different plants being known by the ſame name, it is very difficult to get what we want.

(*f*) *Ala* is the angle formed by a leaf or branch with the ſtem.

(*g*) The figure is that of an inverted cone.

the others nearly the figure of a half ſphere with the convex ſide uppermoſt.

Each of theſe rays is terminated not by a flower, but by another ſet of ſmaller rays, crowning each of the former, exactly as the firſt crown the ſtem.

Here then are two ſimilar and ſucceſſive orders: one of large rays terminating the ſtem, another of ſmaller rays like the others, each of them terminating the great ones *.

The rays of the little umbels are no farther ſubdivided, but each of them is the pedicle to a little flower, of which we ſhall ſpeak preſently.

If you can frame an idea of the figure which I have juſt deſcribed, you will underſtand the diſpoſition of the flowers in the tribe of *Umbelliferous* or *Umbellate* plants: *Umbella* being the Latin word for an umbrella.

Though this regular diſpoſition of the fructification be ſtriking, and ſufficiently conſtant in all the umbellate plants, it is not that however which conſtitutes the character of the tribe. This is taken from the ſtructure of the flower itſelf, which muſt therefore be deſcribed.

But it is expedient for the ſake of greater clearneſs, to give you in this place a general diſtinction with regard to the relative diſpoſition of the flower and fruit in all plants; a diſtinction which extremely facilitates their methodical arrangement, whatever ſyſtem you adopt for that purpoſe.

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* Linnæus calls the firſt the *univerſal*, and the ſecond ſet the *partial* umbel.

The greater number of plants, as the Pink (*h*) for inſtance, have the germ incloſed within the flower; theſe are called *inferior flowers*, as incloſing or being below the germ.

Many however have the germ placed below the flower, as in the Roſe (*i*); for the hip, which is the fruit of it, is that green tumid body which you ſee under the calyx, and this with the corol crowns the germ, and does not envelop it, as in the former caſe; ſuch are called *ſuperior flowers*, as being above the germ.

The umbellate plants have a ſuperior flower. The corol has five petals, called regular, though frequently the two outmoſt petals of the flowers at the extremity of the umbel are larger than the three others.

The form of theſe petals varies in the different genera, but it is uſually cordate or heart-

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(*h*) Or Jaſmine, Roſemary, Sage, Borage, Primroſe, Plum, Cherry, all the ringent, cruciform and papilionaceous tribes, all the compound flowers, &c.

(*i*) Scabious, Honeyſuckle, Currant, Gooſeberry, Elder, Snow-drop, Narciſſus, Hawthorn, Pear, Apple, &c.

heart-ſhaped; they are very narrow next the germ, but gradually widen towards the end, which is emarginate or ſlightly notched; or elſe they finiſh in a point, which being folded back gives the petal the air of being emarginate.

Between each petal is a ſtamen, and the anther generally ſtanding out beyond the corol, the five ſtamens are more viſible than the five petals. I make no mention here of the calyx, becauſe it is not very diſtinct in the umbellate plants.

From the centre of the flower ariſe two ſtyles, each furniſhed with its ſtigma, and ſufficiently apparent; theſe are perſiſtent, or continue after the petals and ſtamens fall off, to crown the fruit.

The moſt uſual figure of this fruit is an oblong oval; when ripe it opens in the middle, and is divided into two naked ſeeds faſtened to the pedicle, which with an art that merits our admiration, divides in two, as well as the fruit, and keeps the ſeeds ſeparately ſuſpended 'till they fall.

All theſe proportions vary in the different genera, but this is the moſt common order. It requires a very attentive eye to diſtinguiſh accurately objects ſo minute without a glaſs; but they are ſo deſerving of attention, that we cannot regret the trouble of it.

This then is the proper character of the umbellate tribe. A ſuperior corol of five petals, five ſtamens, two ſtyles, upon a naked fruit compoſed of two ſeeds growing together.

Whenever you find theſe characters united in one fructification, be ſure that the plant is of this tribe, even though in other reſpects it ſhould have nothing in its arrangement of the order before laid down. And if you ſhould find all this order conformable to my deſcription, and ſee it however contradicted by the examination of the flower, be ſure that you are deceived.

For inſtance, if it ſhould happen, that after having read my letter, you ſhould walk out, and find an Elder in flower, I am almoſt certain that at firſt ſight you would ſay, here is an umbellate plant. In looking at it, you would find a large or univerſal umbel, a ſmall or partial umbel, little white flowers, a ſuperior corol, and five ſtamens: it is certainly an umbellate plant, ſay you. But let us ſee, let us take a flower.

In the firſt place, inſtead of five petals, I find a corol divided into five parts indeed, but all of one piece. Now the flowers of umbellate plants are not monopetalous. There are five ſtamens, but I ſee no ſtyles, and I more often ſee three ſtigmas than two, more often three ſeeds than two. Now the umbellate plants have never more or leſs than two ſtigmas, and two ſeeds to each flower.

Laſtly, the fruit of the Elder is a ſoft berry, and that of the umbellate tribe dry and naked. The Elder then is not an umbellate plant.

If now you go back and inſpect with more accuracy the diſpoſition of the flowers, you will ſee that the Elder has the ſtructure of the umbellate tribe only in appearance. Though the principal rays proceed from the ſame centre; the ſmaller ones are irregular, and the flowers are born on a ſecond ſubdiviſion: in ſhort, the whole has not that order and regularity which we find in the umbellate plants. The arrangement of the flowers in the Elder is called a *Cyme* (*k*). Thus by making a blunder ſometimes, we learn to ſee with more accuracy.

Eryngo, on the contrary, has little or nothing the air of an umbelliferous plant, and yet it is one, becauſe it has all the characters of the fructification. If you were by the ſea-ſide (*l*), you would eaſily know it by the bluiſh colour of the leaves, by their pricklineſs, and by the ſmooth membranous conſiſtence of them like parchment. But this plant is uncommon in other ſituations,

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(*k*) I have been obliged here to correct an error in Rouſſeau, who has made the arrangement of the Elder a *Corymbe*, which it by no means is, according to his own definition in his Botanical Dictionary.

(*l*) Eryngo is alſo very common by road ſides in France, but not with us.

is rough and untractable, has not beauty enough to make you amends for the wounds it will give you in examining it; and though it were ever ſo beautiful, my little Couſin would ſoon be diſguſted at handling ſo ill-humoured a plant.

The umbelliferous tribe is numerous, and ſo natural, that it is very difficult to diſtinguiſh the genera: they are relations, whom we often take for each other, on account of their great reſemblance. To aſſiſt us in diſtinguiſhing them, principal differences are noticed which are ſometimes uſeful, but which we muſt not depend upon too much. The focus of the rays both in the larger or univerſal, and in the ſmaller or partial umbel, is not always naked; it is ſometimes ſurrounded with ſmall leaves. This ſet of ſmall leaves or folioles is called *involucrum*. When it is placed at the origin of the univerſal umbel, it is named the univerſal involucrum; and when at the origin of the partial umbel, it is named the partial involucrum. This gives riſe to three ſections of umbellate plants.

1. Thoſe which have both involucra.

2. Thoſe which have partial involucra only.

3. Thoſe which have neither.

There ſeems a fourth diviſion wanting, of thoſe which have an univerſal involucrum only; but there is no genus which is conſtantly ſo.

Your aſtoniſhing progreſs, my dear Couſin, and unwearied patience, have emboldened me ſo much, that not regarding your ſufferings, I have ventured to deſcribe the umbellate plants, without fixing your eyes upon any model, which muſt needs have rendered your attention much more fatiguing. I am certain, however, that reading as you do, after you have looked over my letter once or twice, an umbellate plant in flower will not eſcape you; and at this ſeaſon you cannot fail finding many, both in the gardens and the fields.

Moſt of them have their little flowers white. As the Carrot, Chervil, Parſley, Hemlock, Fool's Parſley, Angelica, Cow-Parſnep, Water Parſnep, Burnet Saxifrage, Pig-nuts, Cow-weed, &c. (*m*).

Some, as Fennel, Dill, Parſnep, have yellow flowers; there are ſome few with reddiſh flowers, but none of any other colour.

Here, you will tell me, may be a good general notion of umbellate plants: but how will all this vague knowledge enſure me from confounding Fool's-Parſley with true Parſley or Chervil, which you have mentioned

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(*m*) Here, and in other places, I ſet down the names of Hudſon's Flora.

tioned all together? The meaneſt kitchen-maid will know more of this matter than we with all our learning. You are right. But however if we begin with obſervations in detail, we ſhall ſoon be overwhelmed with the number of them, our memory will abandon us, and we ſhall be loſt the firſt ſtep we make in this vaſt region; whereas if we begin with knowing the great roads well, we ſhall ſeldom be loſt in the by-paths, and ſhall always find our way again without much trouble. Let us, however, admit an exception in favour of the utility of the object, and let us not expoſe ourſelves, whilſt we are analyſing the vegetable kingdom, to eat Fool's-Parſley with our meat or in our ſoup through mere ignorance.

This plant, which is ſo common a weed in gardens, is of the umbellate tribe, as well as Parſley and Chervil. It has a white flower as well as they (*n*), it is in the ſame ſection with the latter, among thoſe which have the partial, and not the univerſal involucrum; it is ſo like them in its foliage, that

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(*n*) The flower of Parſley is yellowiſh. But the flowers appear yellow in many of the umbellate plants, from the germ and anthers being ſo, though the corol is white. *Rouſſeau.*—The germ and anthers alſo are frequently large in proportion to the ſize of theſe minute flowers, and the corol eaſily falls off, eſpecially with wet.

that it is not eaſy to mark the difference in writing. But here follow characters ſufficient to prevent you from being miſtaken.

You muſt conſider theſe plants when they are all in flower; for in that ſtate only they have their proper character. The Fool's-Parſley (Æthuſa Cynapium) has under every partial umbel an involucrum of three narrow, long, pointed folioles, all placed on the outer part of the umbel, and hanging down; whereas the folioles of the partial umbels in the Chervil ſurround it entirely, and grow equally on every ſide: and as to Parſley, it has only a few ſhort folioles, fine almoſt as hairs, and diſtributed indifferently at the baſe of both umbels.

When you are very certain of the Fool's-Parſley in flower, you will confirm yourſelf in your judgment by ſlightly bruiſing and ſmelling its foliage; for the diſagreeable venomous ſmell will no longer ſuffer you to confound it with Parſley or Chervil, which have both rather a pleaſant ſmell. Very certain at length, not to make a miſtake, you will examine theſe three plants together and ſeparately in every ſtate, and in all their parts, eſpecially in their foliage, which accompanies them more conſtantly than the flower, and by this examination compared and repeated, 'till you have acquired certainty at ſight, you will be able to know and diſtinguiſh them without the leaſt trouble.

Thus does ſtudy bring us to the very door of practice, after which the latter confers the facility of knowing things.

Take breath, dear Couſin, for this is an unconſcionable letter; and yet I dare not promiſe you more diſcretion in the next; after that however we ſhall have nothing before us but a path bordered with flowers. You deſerve a garland for the chearfulneſs and perſeverance with which you have condeſcended to follow me through theſe briars, without being diſcouraged at their thorns.

LETTER VI.

May the 22d, 1773.

THOUGH there is ſtill, dear Couſin, a great deal wanting to complete our idea of the five former tribes of plants, and I have not always known how to adapt my deſcriptions to the underſtanding of our young Botaniſt; I flatter myſelf however that I have given you ſuch an idea of them, as to enable you, after ſome months herborization, to render the *air*, *port*, or *habit* of each tribe familiar to you: ſo that when you ſee a plant, you may conjecture nearly whether it belongs to one of theſe five tribes, and to which; provided always that by an analyſis of the fructification, you afterwards ſee whether you may not have been deceived in your conjecture. The umbellate plants, for inſtance, have thrown you into ſome embarraſſment, from which however you may eaſily eſcape when you pleaſe, by means of the hints which I have ſubjoined to my deſcriptions: in ſhort, Carrots and Parſneps are ſo common, that nothing is eaſier in the middle of ſummer than for the gardener to ſend you one or other of them in flower out of the kitchen garden. Now from the mere view of an umbel, and the plant which bears it, you muſt acquire ſo clear an idea of the umbellate tribe, that you will rarely be deceived at firſt ſight, whenever you meet with one. This is all that I have hitherto pretended; for we have nothing to do yet with genera and ſpecies; and I repeat it once more, that it is not the nomenclature of a parrot which I wiſh you to acquire, but a real ſcience, and one of the moſt delightful ſciences that it is poſſible to cultivate. I go on therefore to our ſixth tribe before I take a more methodical road. It may perhaps at firſt embarraſs you, as much, if not more than the umbellate plants. But my deſign at preſent is nothing more than to give you a general notion of it, eſpecially as we have ſtill plenty of time, before the generality of theſe plants are in full flower; and the interval well employed will ſmooth thoſe difficulties, againſt which we have not yet ſtrength to contend.

Take one of thoſe little flowers, which, at this ſeaſon, cover all the paſtures, and which every body knows by the name of *Daiſy*. Look at it well; for by its appearance, I am ſure you will be ſurpriſed when I tell you, that this flower, which is ſo ſmall and delicate, is really compoſed of between two and three hundred other flowers, all of them perfect; that is, having each its corol, germ, piſtil, ſtamens and ſeed; in a word, as perfect in its ſpecies as a flower of the Hyacinth or Lily. Every one of thoſe leaves which are white above, and red underneath, and form a kind of crown round the flower, appearing to be nothing more than little petals, are in reality ſo many true flowers; and every one of thoſe tiny yellow things alſo which you ſee in the centre, and which at firſt you have perhaps taken for nothing but ſtamens, are real flowers. If your fingers were already exerciſed in Botanical diſſections, and you were armed with a good glaſs, and plenty of patience, I might convince you of the truth of this; but at preſent you muſt begin, if you pleaſe, by believing me on my word, for fear of fatiguing your attention upon atoms. However, to put you at leaſt in the way, pull out one of the white leaves from the flower; you will think at firſt that it is flat from one end to the other; but look carefully at the end by which it was faſtened to the flower, and you will ſee that this end is not flat, but round and hollow in form of a tube, and that a little thread ending in two horns iſſues from the tube; this thread is the forked ſtyle of the flower, which as you now ſee, is flat only at top.

Now look at thoſe little yellow things in the middle of the flower, and which as I have told you are all ſo many flowers; if the flower is ſufficiently advanced, you will ſee ſeveral of them open in the middle, and even cut into ſeveral parts.

Theſe are monopetalous corols which expand, and a glaſs will eaſily diſcover in them the piſtil, and even the anthers with which it is ſurrounded. Commonly the yellow florets towards the centre are ſtill rounded and cloſed. Theſe however are flowers like the others, but not yet open; for they expand ſucceſſively from the edge inwards. This is enough to ſhow you by the eye, the poſſibility that all theſe ſmall affairs, both white and yellow, may be ſo many diſtinct flowers; and this is a conſtant fact. You perceive nevertheleſs, that all theſe little flowers are preſſed, and incloſed in a calyx, which is common to them all, and which is that of the Daiſy. In conſidering then the whole Daiſy as one flower, we give it a very ſignificant name, when we call it a *compound flower.* Now there are many genera and ſpecies of flowers formed, like the Daiſy, of an aſſemblage of other ſmaller flowers, contained in a common calyx. This is what conſtitutes the ſixth tribe, of which I propoſed to treat, namely that of the *Compound flowers.*

Let us begin by avoiding all ambiguity with regard to the word flower, which we may do in the preſent caſe by reſtraining it to the compound flower, and giving the name of *Floſcules* or *Florets* to the little component flowers; but in the midſt of this verbal preciſion let us not forget, that each of theſe florets is a genuine flower.

You have obſerved two ſorts of florets in the Daiſy: the yellow ones, which occupy the middle or diſk of the flower, and the little white tongues or ſtraps which ſurround them.

The former are ſomething like the flowers of the Lily of the Valley or Hyacinth, in miniature; and the latter bear ſome reſemblance to thoſe of the Honeyſuckle. We ſhall leave to the firſt the name of *Florets*, and to diſtinguiſh the ſecond we ſhall call them *Semi-florets* (*o*): for in reality they have a little the air of monopetalous flowers gnawed off on one ſide, and having ſcarcely half the corol remaining.

Theſe two ſorts of florets are combined in the compound flowers in ſuch a manner, as to divide the whole tribe into three ſections, very diſtinct from each other.

The firſt ſection conſiſts of thoſe which are entirely compoſed of ſemiflorets, both in the middle and circumference; theſe are called *Semi-floſculous flowers*, and the whole is always of one colour, which is generally yellow. Such is the common Dandelion, the Lettuce and Sowthiſtle; the Succory and Endive, which have blue flowers; the Scorzonera, Salſafy, &c.

The ſecond ſection comprehends the *Floſculous flowers*, or ſuch as are compoſed of florets only; theſe are alſo commonly of one colour: as Immortal flowers, Burdock, Wormwood,

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(*o*) Linnæus alſo calls theſe *ligulate* flowers, from *ligula* a ſtrap.

wood, Mugwort, Thiſtles, and Artichoke, which is nearly allied to them; it is the calyx of this that we ſuck, and the receptacle that we eat, whilſt it is yet young, before the flower opens, or is even formed. The choke, which we take out of the middle, is an aſſemblage of florets which are beginning to be formed, and are ſeparated from each other, by long hairs fixed in the receptacle.

The third ſection, is of flowers compoſed of both theſe. They are always ſo arranged, that the florets occupy the centre of the flower, and the ſemi-florets the circumference, as you have ſeen in the Daiſy. The flowers of this ſection are called *Radiate.* Botaniſts have given the name of *ray*, to the ſet of ſemi-florets which compoſe the circumference; and of *diſk* to the area or centre of the flower occupied by the florets. This name of diſk is ſometimes given to the ſurface of the receptacle in which all the florets and ſemi-florets are fixed. In the radiate flowers, the diſk is often of one colour and the ray of another; there are however genera and ſpecies in which both are alike.

Let us endeavour now to fix in your mind an idea of a *compound flower*. The common Clover is in blow at this ſeaſon; the flower is purple: if you ſhould take one in hand, ſeeing ſo many little flowers aſſembled, you might be tempted to take the whole for a compound flower. You would however be miſtaken; in what? ſay you: why in ſuppoſing that an aſſemblage of many little flowers is ſufficient to conſtitute a compound flower; whereas beſides this, one or two parts of the fructification muſt be common to them all, ſo that every one muſt have a part in it, and no one have its own ſeparately. Theſe two parts in common, are the calyx and receptacle. The flower of the Clover indeed, or rather the group of flowers, which has the appearance of being but one flower, ſeems at firſt to be placed upon a ſort of calyx; but remove this pretended calyx a little, and you will perceive that it does not belong to the flower, but that it is faſtened below it to the pedicle that bears it. This then is a calyx only in appearance; but in reality it belongs to the foliage, not to the flower; and this ſuppoſed compound flower is only an aſſemblage of very ſmall leguminous or papilionaceous flowers, each of which has its diſtinct calyx, and they have nothing common to them but their being faſtened to the ſame pedicle. Vulgarly all this is taken for one flower; it is a falſe idea however, or if we muſt look upon it as ſuch, we muſt not at leaſt call it a compound, but an *aggregate* or *capitate* flower, or a *head* of flowers; and theſe terms are ſometimes ſo applied by botanical writers.

This, dear Couſin, is the moſt ſimple and natural notion I can give you of this numerous claſs of compound flowers, and the three ſections into which it is ſubdivided. I now come to the ſtructure of the fructifications particular to this claſs, and this perhaps will bring us to determine the character of it with more preciſion.

The moſt eſſential part of a compound flower is the receptacle, upon which are placed, firſt the florets and ſemi-florets, and then the ſeeds which ſucceed them. This receptacle which forms a diſk of ſome extent, makes the centre of the calyx, as you may ſee in the Dandelion, which we will here take as an inſtance. The calyx in this tribe is commonly divided into ſeveral parts down to the baſe, that it may cloſe, open again and turn back, as it does during the progreſs of the fructification, without being torn. The calyx of the Dandelion is formed of two rows of folioles inſerted into each other, and the folioles of the outer row turn back and curl downwards towards the pedicle, whilſt the folioles of the inner row continue ſtraight, to ſurround and hold in the ſemi-florets compoſing the flower.

One of the moſt common forms alſo of the calyx in this claſs is the *imbricate*, or that which is made up of ſeveral rows of folioles laying over each other like tiles on a roof. The Artichoke, Blue-bottle, Knapweeds, and Scorzoneras may ſerve as inſtances of imbricate calyxes.

The florets and ſemiflorets incloſed within the calyx are placed very thick upon the diſk or receptacle in form of a quincunx or the checks upon a cheſs-board. Sometimes they touch each other without any thing interpoſed between them, ſometimes they are ſeparated by partitions of hairs or ſmall ſcales which continue faſt to the receptacle after the ſeeds are fallen. You are now in the way to obſerve the differences of calyxes and receptacles; we will go on then to the ſtructure of florets and ſemiflorets, beginning with the former.

A floret is a monopetalous flower, commonly regular, with the corol divided at top into four or five parts. The five filaments of the ſtamens are faſtened to the tube of this corol: they are united at top into a little round tube, which ſurrounds the piſtil, and this tube is the five anthers united circularly into one body. This union of the anthers, according to modern Botaniſts, forms the eſſential character of compound flowers, and belongs to their florets only, excluſively of all others. If therefore you find ſeveral flowers upon the ſame diſk, as in the Scabiouſes and Teaſels; unleſs the anthers are united in a tube round the piſtil, and the corol ſtands upon one naked ſeed; ſuch flowers are not florets, nor do they form a compound flower. On the contrary, whenever you find in a ſingle flower the anthers thus united, and a ſuperior corol on a ſingle ſeed, this flower, though ſole, is a genuine floret, and belongs to the compound tribe: for it is better thus to take the character from a preciſe ſtructure, than from a deceitful appearance.

The piſtil has the ſtyle generally longer than the floret, above which it riſes through the tube formed by the anthers. It is moſt frequently terminated at top by a forked ſtigma, the two curling horns of which are very viſible. The piſtil does not reſt upon the receptacle, any more than the floret, but both upon the germ, which ſerves them as a baſe, and grows and lengthens as the floret withers, becoming in time a longiſh ſeed, remaining faſtened to the receptacle till it is ripe. Then it falls, if it be naked; or the wind wafts it to a diſtance, if it be crowned with an egret of feathers or hairs; and the receptacle remains quite naked in ſome genera, but is furniſhed with ſcales or hairs in others.

The ſtructure of the ſemiflorets is like that of the florets; the ſtamens, the piſtil, and the ſeed are arranged almoſt in the ſame manner: only in the radiate flowers there are many genera wherein the ſemiflorets of the ray are apt to be abortive, either becauſe they have no ſtamens, or becauſe thoſe which they have are barren; in ſuch caſes the flower ſeeds only by the florets in the middle (*p*).

(*p*) Sun-flower.

In the whole compound claſs, the ſeed is always ſeſſile, that is, it bears immediately upon the receptacle without any intermediate pedicle. But there are ſeeds in which the down or egret which crowns them is ſeſſile (*q*); and others in which it is faſtened to the ſeed by a pedicle (*r*). You underſtand that the uſe of this down is to ſpread the ſeeds about to a diſtance, by giving the air more hold upon them.

To theſe irregular imperfect deſcriptions, I ſhould add that the calyx has generally the property of opening when the flower expands; of cloſing when the florets fall off, in order to confine the young ſeed, and to hinder it from falling before it is ripe; and laſtly of opening again and turning quite back to give a larger area to the ſeeds which increaſe in ſize as they grow ripe. You muſt often have ſeen the Dandelion in this ſtate, when children gather it, to blow off the down that forms a ball round the reverted calyx.

To underſtand this claſs well, you muſt follow the flowers from before their expanſion to the full maturity of the fruit, and in this ſucceſſion you will ſee transformations and a chain of wonders, which will keep every ſenſible mind that obſerves them, in a continual admiration. One flower proper for theſe obſervations is the Sunflower, which

(*q*) Thiſtles, Artichoke.

(*r*) Lettuce, Dandelion.

is radiate; as are alſo Ox-eye, Chineſe Aſter, and many others which are the ornament of the borders in autumn. I have already ſaid that there are Thiſtles for the floſculous, and Scorzonera and Dandelion for the ſemifloſculous flowers. All theſe are large enough to be diſſected, and ſtudied with the naked eye, without fatiguing yourſelf too much.

I will not trouble you at preſent any more upon the tribe or claſs of compound flowers. I tremble already at having abuſed your patience too much by details which would have been clearer if I had known how to make them ſhorter; but it is impoſſible for me to avoid the difficulty ariſing from the ſmallneſs of objects. Adieu, dear Couſin.

LETTER VII.

HERE, dear Couſin, you have the names of thoſe plants which you ſent me laſt. I have put a mark of interrogation to thoſe which I had any doubt of, becauſe you had not taken care to put the leaves with the flower, and they are often neceſſary to determine the ſpecies, eſpecially to ſo ſlender a Botaniſt as I am. When you arrive at Fourriere you will find moſt of the fruit-trees in flower, and I remember you requeſted ſome directions from me upon this article. At preſent I can only give you ſome hints upon the ſubject, becauſe I am very buſy, and yet I would not have you loſe the ſeaſon for this examination.

You muſt not, my dear friend, give more importance to Botany than it really has; it is a ſtudy of pure curioſity, and has no other real uſe than that, which a thinking ſenſible being may deduce from the obſervation of nature, and the wonders of the Univerſe.

Man has changed the nature of many things, to convert them better to his own uſe; in that he is not to be blamed; but then it is nevertheleſs true that he has often disfigured them, and that when he thinks he is ſtudying nature in the works of his own hands, he is frequently miſtaken. This error is found above all in civil ſociety; but it has a place alſo in gardens. The double flowers which we admire ſo much in our borders and beds, are but monſters deprived of the power of producing their like, a power with which nature has endowed every organized being. Fruit-trees are ſomewhat in the ſame caſe by being engrafted; you may plant the pips or ſeeds of pears and apples of the beſt ſorts, but they will produce nothing but wildings. To know then the pear and the apple of nature, you muſt not look for them in orchards, but in woods. The fleſh or pulp is not ſo large and ſucculent, but the ſeeds ripen better, multiply more, and the trees are vaſtly bigger and more vigorous. But I am entering on a ſubject that would carry me too far: let us return to the orard.

Our fruit-trees, though engrafted, preſerve all the botanical characters which diſtinguiſh them, and it is by an attentive conſideration of theſe characters, as well as by the transformation of the graft, that we aſcertain there being but one ſpecies of Pear for inſtance, under a thouſand different names, by which the ſhape and taſte of their fruits has cauſed them to be diſtinguiſhed into ſo many pretended ſpecies, which are at bottom but varieties. Nay more, the pear and apple are only two ſorts or ſpecies of the ſame kind or genus, and their only characteriſtic difference is, that the ſtalk of the apple enters into a hollow in the fruit, and that of the pear is faſtened to the narrow part of a fruit a little lengthened out (*s*). In the ſame manner the different ſorts of cherries are nothing but varieties of the ſame ſpecies; all the Plums are but one ſpecies of Plum; nay the genus of *Prunus* or Plum contains three principal ſpecies, the Plum properly ſo called, the Cherry and the Apricot, which alſo is only a ſpecies of Plum. Thus when the learned Linnæus in dividing the genus into its ſpecies has enumerated the domeſtic Plum, the Plum Cherry, and the Plum Apricot*, ignorant people have laughed at him, but obſervers have admired the juſtneſs of his arrangement.

The fruit-trees belong moſtly to a numerous tribe, which has a character not difficult to ſeize, the ſtamens, which are many in number, inſtead of ariſing from the receptacle, are faſtened to the calyx either imme-

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(*s*) Nor is this always conſtant, ſome Pears having the common ſhape of the Apple. It is extremely difficult to find any permanent differences between fruits, which are diſtinguiſhed by every body at firſt ſight. We may add, however, that the corols of the Pear are white, thoſe of the Apple red on the outſide: the Apple alſo has a firmer pulp, and none of thoſe tubercles which ſome ſorts of Pear have: and laſtly, the leaves of the Pear are very ſmooth; thoſe of the Apple more rounded, leſs ſerrated, and villous underneath.

* Prunus domeſtica. Prunus Ceraſus. Prunus Armeniaca.

diately, or with the corol, which is polypetalous, and conſiſts commonly of five petals. The following are characters of ſome of the principal genera.

The Pear, comprehending alſo the Apple and the Quince, has the calyx monophyllous, divided into five ſegments; the corol of five petals faſtened to the calyx, about twenty ſtamens, all faſtened likewiſe to the calyx. The germ is inferior, and there are five ſtyles. The fruit, as every body knows, is fleſhy, and has five cells containing the ſeeds.

The genus Plum, comprehending the Apricot and Cherry, as was before obſerved, and alſo the Laurel, has the calyx, corol, and ſtamens nearly as in the Pear. But the germ is ſuperior, or within the corol; and there is but one ſtyle. The fruit is rather watery than fleſhy, and contains a ſtone.

The genus Almond, including the Peach and Nectarine, is almoſt like the Plum, but the germ has a down upon it, and the fruit, which every body knows is ſucculent in the Peach, and dry in the Almond, incloſes a hard ſtone, which is rough and full of cavities (*t*).

All this is very roughly ſketched out, but I hope contains enough to amuſe you for the preſent. Adieu dear Couſin.

(*t*) Beſides thoſe mentioned above, this claſs, called *Icoſandria* by Linnæus, contains other fruits, as the Pomgranate, Service, Medlar, Raſpberry, Strawberry, &c.

LETTER VIII.

April the 11th, 1773.

THE earth, dear Couſin, begins to put on its green robe, the trees to bud, the flowers to open; ſome are even already paſt; an inſtant of delay would be the loſs of a whole year for Botany: I proceed then without farther preamble.

I fear we have hitherto treated our ſubject in too abſtract a way, by not having applied our ideas to determinate objects: it is a fault which I have been guilty of, eſpecially in the umbellate tribe. If I had begun by ſetting one of them before your eyes, I ſhould have ſpared you a very fatiguing application to an imaginary object, as well as a very difficult deſcription to myſelf, and ſuch as a ſingle look would have ſupplied. Unfortunately, at a diſtance to which the law of neceſſity reſtrains me, I am not able to deliver the objects into your hand; but provided each of us can but ſee with the ſame eyes, we ſhall underſtand one another very well, when we relate what we ſee. The whole difficulty is, that the indication muſt come from you; for to ſend you dried plants from hence, would be doing nothing. To know a plant well, you muſt begin with ſeeing it growing. A *Hortus Siccus*, by which Latin term we call a collection of dried plants, may ſerve to put us in mind of the plants we have once known; but gives us only a poor knowledge of thoſe, which we have never ſeen before. You therefore muſt ſend me ſuch plants as you wiſh to know, and have gathered yourſelf; and it is my buſineſs to name, claſs and deſcribe them; 'till by comparative ideas, become familiar to your eyes and your underſtanding, you arrive at claſſing, ranging and naming by yourſelf, thoſe which you ſee for the firſt time: and this is the ſcience which diſtinguiſhes the true Botaniſt from the mere Herbariſt or Nomenclator. My deſign then here is to learn you how to prepare, dry and preſerve plants or ſpecimens of plants, in ſuch a manner as that they may be eaſily known and determined. In a word, I propoſe to you to begin a *Hortus ſiccus*. Here is a deal of buſineſs preparing at a diſtance for our little Botaniſt: for at preſent, and for ſome time to come, the addreſs of your fingers muſt ſupply the weakneſs of hers.

Firſt, here is ſome proviſion to be made; namely, five or ſix quires of gray paper, and almoſt as many of white, of the ſame bigneſs, pretty ſtrong and well ſized, without which the ſpecimens would rot in the gray paper, the plants or at leaſt the flowers would loſe their colour, and this of all the parts is that by which they are moſt eaſily

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known, and which it is moſt pleaſant to ſee in a collection of dried plants (*v*). It were alſo to be wiſhed that you had a preſs of the ſame ſize with your paper, or at leaſt two pieces of board well planed, between which you may keep your papers and ſpecimens, preſſed by ſtones or any other weight, with which you may load the upper plank. When you have made theſe preparations, you muſt obſerve the following rules in order to prepare your plants ſo as to preſerve them and know them again.

The preciſe time to gather your plant is when it is in full flower, or rather when ſome of the flowers begin to fall, to give place to the fruit, which begins to make its appearance. It is at this time, when all parts of the fructification are viſible, that you muſt endeavour to gather the plant in order to dry it.

Small plants may be taken whole with their roots, which muſt be bruſhed, that no

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(*v*) I make uſe only of what we vulgarly call whited-brown paper, unleſs I have red, commonly called blotting paper, which is preferable to all others becauſe it is the moſt abſorbent. I change the ſpecimens at leaſt once a day, ſeparating thoſe which dry quick, from others that are more ſucculent, and therefore both require more time, and more frequent changing: always ſhifting them into very dry papers. When the ſpecimens are well dried and quite ſtiff, I lay them by in large ſtrong white or cartridge paper. Some particular plants require more attention to preſerve their colours, and others loſe their colours with all the care we can take.

earth may remain. If the earth is wet, it muſt either be dried, that it may be bruſhed, or elſe the root muſt be waſhed; but in this caſe you ſhould wipe it well, and dry it, before you put it into the papers, without which it would infallibly rot, and injure the plants near it. You need not however preſerve the roots, unleſs they have ſome remarkable ſingularities; for in moſt plants, the branching fibrous roots are ſo alike, that it is not worth the trouble. Nature, which has done ſo much for elegance and ornament in the form and colour of plants, in whatever ſtrikes our ſight, has deſtined the roots entirely to uſeful functions, becauſe being concealed within the earth, to give them an agreeable ſtructure, would have been to hide the light under a buſhel.

Trees and all great plants can only be had by ſpecimens. But then that ſpecimen ſhould be ſo well choſen, as to contain all the conſtituent parts of the genus and ſpecies, that it may ſuffice to know and determine the plant from whence it is taken. It is not ſufficient that all the parts of the fructification are diſtinguiſhable, which would be enough to determine the genus, but the character of the foliation and ramification alſo muſt be ſufficiently viſible; that is, the origin and form of the leaves and branches, and even as much as may be, ſome portion of the main ſtem itſelf; for as you will ſee in the ſequel, all this ſerves to diſtinguiſh the ſpecies of the ſame genus, which are perfectly alike in the flower and fruit. If the branches are too thick, they may be made thinner, by cutting them with a ſharp knife nicely underneath, as much as may be, without cutting and mutilating the leaves. There are Botaniſts who have the patience to ſlit the bark and draw the wood out ſo nicely, that when the bark is united again, the branch ſeems to be entire, though the wood is gone: by which means there are none of thoſe inequalities and bumps, which ſpoil and disfigure a collection, and give a bad form to the plants. Where the flowers and leaves do not come out at the ſame time, or grow too far diſtant from each other, you will take a little branch in flower and another in leaf, and placing them together on the ſame leaf of your book, you thus have before you different parts of the ſame plant, ſufficient to give you a complete knowledge of it. As to plants where you find only the leaves, the flower being either paſt, or not yet come, you muſt wait with patience 'till they ſhow their faces, to be fully acquainted with them. A plant being no more certainly to be known by its foliage, than a man by his clothes.

Such is the choice that you ſhould make in what you gather: you muſt have a choice alſo as to the time in which you do it.

Plants gathered in the morning before the dew is off, or in the evening when it is damp, or in the day-time when it is wet, will not keep. You muſt abſolutely choofe a dry ſeaſon, and even then, the drieſt and hotteſt time of the day, which in ſummer is between eleven in the morning and five in the afternoon. Even then, if you find the leaſt moiſture on them, you muſt not take them, for they will certainly not keep.

When you have gathered your ſpecimens, you muſt bring them home as ſoon as you can, quite dry, to put and arrange them in your papers. For this purpoſe, you lay down at leaſt one ſheet of gray paper, upon this half a ſheet of white paper, and then your plant, taking great care that all the parts of it, eſpecially the leaves and flowers, are well opened, and laid out in their natural ſituation. If the plant is a little withered, without being too much ſo, it will generally ſpread out better upon the paper, with the fingers and thumb. But there are rebellious plants which ſtart up on one ſide, whilſt you are ranging them on the other. To prevent this inconvenience, I have leads, halfpence, and farthings, which I place upon thoſe parts that I have juſt put in order, whilſt I am arranging the reſt, ſo that when I have done, my plant is almoſt covered with theſe pieces, which keep it in its proper ſituation. Then you place another half ſheet of white paper upon the firſt, preſſing it with your hand, to keep the plant in the poſition you have given it, bringing your left hand that preſſes gradually forward, and at the ſame time taking away the leads, &c. with your right; then put another ſheet of gray paper upon the ſecond white paper, all the while preſſing the plant, leſt it loſe the poſition you have given it: upon the gray paper place another half ſheet of white, as before; upon this another plant arranged and covered like the former, 'till you have placed your whole harveſt, which ought not to be too numerous at once; both that your taſk may not be too laborious, and that your paper may not contract too much humidity during the drying; which would infallibly ſpoil your plants, unleſs you haſtened to change the papers with the ſame attention as before; this however is what you muſt do from time to time; 'till your ſpecimens have taken their bent, and are all very dry.

Your pile of plants and papers thus arranged, muſt be put into the preſs, without which your plants would not be flat and even; ſome are for preſſing them more, others leſs; experience will teach you this, as well as how often the papers ſhould be changed, without taking unneceſſary pains. Laſtly, when your plants are quite dry, put each of them ſeparately into a ſheet of paper, one upon another, without other papers between, for which there is no occaſion, and you will thus begin a *bortus ſiccus*, which will continually increaſe with your knowledge, and at length contain the hiſtory of all the vegetation of the country. Take care always to keep your collection very cloſe, and a little preſſed; without which the plants, however dry they might be, will attract the humidity of the air, and again get out of form.

Now the uſe of all this pains is to arrive at a knowledge of each particular plant, and to underſtand one another well when we talk of them.

For this purpoſe you muſt gather two ſpecimens of each plant; one larger to be kept, the other ſmaller to ſend me. You muſt number them carefully, ſo that both great and little ſpecimen ſhall always have the ſame number. When you have a dozen or two of ſpecies thus dried, you will ſend them to me in a little parcel by the firſt opportunity. I will ſend you back their names and deſcriptions; by means of the numbers, you will know them in your collection, and after that in their natural ſtate, wherein I preſume you firſt examined them. This is the certain way to make as ſecure and rapid a progreſs as you can, at a diſtance from your guide.

P. S. I forgot to tell you that the ſame papers may ſerve over and over again, provided you take care to air and dry them well. I ſhould alſo add here, that your *hortus ſiccus* muſt be kept in the drieſt part of the houſe, and rather on the firſt, than the ground floor.

LETTER IX.

March the 25th, 1774.

I Have received, dear Couſin, very ſafe, all your packets, and cannot but admire the neatneſs with which you have arranged your plants, the care you have taken in having all the parts neceſſary to determine both the genus and ſpecies in your ſpecimens, and the brilliancy of colour in moſt of the flowers. All this ſerves to ſhow how much better the female fingers are adapted to ſuch operations than ours. I am pleaſed alſo to hear that our little Botaniſt had ſo large a ſhare in laying out and drying theſe plants, which I ſhall carefully preſerve as a memorial of the induſtry and adroitneſs of both. But what gives me the moſt pleaſure is, to ſee that you have remarked with ſo much ſucceſs in general, to which of the natural claſſes your plants belong. So that I am well convinced you have profited by my leſſons, and have paid a due attention to my letters.

What reward, dear Couſin, can I give you for your unwearied patience and perſeverance in following me through ſo much abſtract matter, when your curioſity muſt needs have been piqued, and your deſire of being acquainted with the rank and names of the beautiful objects which you gathered, arranged and dried with ſo much affection, muſt have been awakened? I have now in ſome degree endeavoured to content you, by the paper which accompanies this, containing the names of all the plants in your packets, placed after the numbers which you have put to them in your collection. So that to the common objects which you knew by rote, you are now enabled to add a conſiderable number, whoſe acquaintance you will value more, becauſe you know them upon thorough examination. You have therefore ſo many more points to reſt upon; but this is not ſufficient: you cannot be a Botaniſt 'till you are able to help yourſelf, to caſt me off entirely, and to find out a plant with which you are unacquainted. All this however will ſtill require ſome time and patience; and as you remember that you are not to take any more ſteps in this kingdom than are agreeable, you will inform me when you are tired.

Such information I propoſe now to convey to you by degrees. And having initiated you, by ſhowing how you may determine the claſs of ſome plants, I will now open the whole myſtery, and ſhow you how to determine the claſs of them all. To do this you muſt learn a ſyſtem; in which however you are not to expect that all vegetables are arranged in natural claſſes, ſuch as I have hitherto explained to you, but after an artificial method, the order of Nature not being in all points yet unveiled to our mortal eyes. Your pains however will not have been thrown away, becauſe I promiſe you that our artificial ſyſtem ſhall preſerve the natural tribes, which you have ſtudied ſo well.

Do not ſuffer yourſelf, dear Couſin, to be terrified at the word *Syſtem*. I promiſe you there ſhall be little difficulty in it to you who have patience and attention; and as little parade of hard words as poſſible, only allowing me to name my claſſes and orders (*a*). The Syſtem I propoſe to you is not the French one by Tournefort, which is very beautiful, and has great merit; but the Swediſh one by Linnæus. I prefer this, becauſe it is moſt complete, and moſt in faſhion.

You are ſo well acquainted with all the conſtituent parts of the fructification, that you need not be told what the ſtamens and piſtils are. Linnæus has founded his Claſſes upon the former, and many of his Orders upon the latter of theſe. But at preſent the Claſſes will furniſh you with ſufficient employment.

(*a*) The Engliſh ſtudent will find a great advantage in poſſeſſing many elementary books, explaining all the terms, in his own language; eſpecially the Botanical Dictionary of Berkenhout, ſo commodious for its being alphabetical. Now alſo he has Linnæus's Syſtem of Vegetables tranſlated. And Hudſon's Flora Anglica connects the Engliſh names with thoſe of Linnæus.

I ſuppoſe you to take a plant in hand that is in full flower; the firſt thing you have to ſee is, whether the flowers are complete or perfect, that is, have both ſtamens and piſtils: if ſo, view the ſtamens well, in order to diſcover whether they are entirely ſeparate from the piſtil and each other from top to bottom, or united in ſome part or other: if they are ſeparate, of the ſame, or an indeterminate length, and leſs in number than twenty, then the number alone will ſuffice to determine the claſs: and thoſe which have one ſtamen will belong to the firſt claſs entitled *Monandria*, thoſe with two ſtamens to the ſecond, *Diandria*, thoſe with three to the third, *Triandria*, and ſo on to the tenth, entitled *Decandria*. Theſe are Greek names, and ſome of them not ſhort ones; ſince however they are only four-and-twenty in all, you will indulge me ſo far in time as to have them by heart. The flowers for examination ſhould be gathered as nearly as poſſible in their natural ſtate; for many of thoſe which are cultivated in gardens undergo ſtrange transformations, and either loſe the ſtamens and piſtils entirely, or acquire an additional number. The firſt claſſes which have but few ſtamens are not ſo liable to change as thoſe which have many. Thus the number in the three claſſes already mentioned is not variable; nor in the fourth claſs, *Tetrandria*. In the fifth, *Pentandria*, ſome plants have more than their proper quota of ſtamens to the flower, at leaſt when cultivated in gardens; but this is a very numerous claſs, and it is no wonder if we find ſome few irregular among ſo many. To ſecure you in ſome meaſure againſt miſtakes on this and other occaſions, I muſt obſerve, that nature in general, carries a certain proportion through all the parts of the ſame work: and therefore if you have a flower which has a calyx divided into five ſegments, and a corol conſiſting of five petals, or divided into five parts; if you count ſix or ſeven ſtamens, be ſure all is not right, and take the pains to inſpect ſome other flowers of the ſame ſpecies, before you determine. I dare affirm ſuch examination will convince you that your flower belongs to the fifth claſs, *Pentandria*, in which the natural number of ſtamens is five. In the ſixth claſs, *Hexandria*, whoſe beautiful flowers have ſix ſtamens, I do not obſerve ſo conſiderable a variation as one might expect in plants that are ſo much the objects of culture; you will however frequently count more than ſix ſtamens in the flowers of the Tulip. The flowers of the claſs *Heptandria* ſhould have ſeven ſtamens; but you will often find thoſe of the Horſe-Cheſnut peccant in this reſpect. As you will alſo ſome flowers in the three following claſſes, *Octandria* which has eight, *Enneandria* which has nine, and *Decandria* which has ten ſtamens,

mens, as the names all imply. With a little attention however to the proportion of the parts, and a repetition of your examination where any doubt ariſes, you will find theſe ten claſſes eaſy to determine.

No flowers being known at preſent that have conſtantly and regularly eleven ſtamens, the eleventh claſs in the ſyſtem of Linnæus contains thoſe which have twelve; and is therefore entitled *Dodecandria*. But the genera which have this preciſe number being few; and, as I obſerved before, the number being uncertain when the ſtamens are many; all plants are included in this claſs that have any number of ſtamens from eleven to nineteen incluſive, provided they are diſunited. All plants that have more ſeparate ſtamens than theſe, belong to one of the two following claſſes. Here then you muſt take in another conſideration, beſides the number of the ſtamens, to determine in which of theſe two claſſes you are to ſearch for your plant. This conſideration is, the *ſituation* of the ſtamens; which in the claſs *Icoſandria*, is either on the calyx or corol, and in the thirteenth, *Polyandria*, on the baſe or receptacle of the flower. This difference of ſituation is only to be attended to in thoſe flowers which have many ſtamens, for you will frequently obſerve in the fifth claſs that the monopetalous flowers have the ſtamens growing out of the corol; but this circumſtance has nothing to do in determining their claſs. The twelfth claſs has its name *Icoſandria*, from the flowers in it having uſually twenty ſtamens or thereabouts, at leaſt in the greater part of the genera: this circumſtance however is not to determine the claſs; but all plants which have many ſtamens, that is, more than nineteen, faſtened either immediately, or mediately by means of the tails of the petals, to the calyx, are to be referred to the claſs *Icoſandria*. To aſſiſt you farther in diſtinguiſhing the flowers of this from thoſe of the following claſs, it may be remarked that the calyx in this is monophyllous or all of one piece, and concave; and the corol is fixed by its tail or ſmall end into the calyx, inſtead of the baſe or bottom of the flower, as it generally is in the other claſſes.

When on the contrary you find more than nineteen detached ſtamens in the ſame flower, with a piſtil or piſtils, and ſituated on the baſe or receptacle of the flower, that plant muſt belong to the claſs *Polyandria*, ſignifying many ſtamens, and the ſtamens may vary in number from twenty to a thouſand in the different genera. Theſe alſo either have a polyphyllous calyx, that is, conſiſting of ſeveral folioles, generally five, or none at all; though ſometimes it falls off, as in the Poppy, when the flower opens.

We have hitherto ſuppoſed you to find all the ſtamens of the ſame length, or nearly ſo; or if not, ſtill we preſume that you have not found a certain regular and determinate proportion in their lengths. Now on the contrary we ſuppoſe you to take up a flower which has an appearance of regularity in its whole ſtructure; and that on an attentive examination you diſcover four ſtamens, not all equal in length, but ranged in one row, and the inner pair ſhorter than the outer one. This plant will probably belong to the fourteenth claſs, the name of which is *Didynamia*, ſignifying that two of the ſtamens are ſtronger than the others. Here you will immediately perceive that you are got among your old acquaintance, for it will ſtrike you that all the flowers which have the character juſt deſcribed are either labiate or perſonate, and therefore that you was miſtreſs of the claſs *Didynamia*, before you knew that it had this Greek name (*b*). All then that I need ſay to you is, that Linnæus makes the eſſential character to conſiſt, in the proportional arrangement of four ſtamens above expreſſed, accompanied with one piſtil, and inveſted with an irregular monopetalous corol.

There is yet another claſs of theſe plants with proportional ſtamens, which though

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(*b*) See Letter IV.

you do not know it by the dreadful long name *Tetradynamia*, is however one of your firſt acquaintance under the gentler appellation of cruciform flowers (*c*). Theſe you remember have four ſtamens longer than the other two : this is the claſſical character, and hence its name. For the other diſtinctive marks by which this claſs is readily known at firſt ſight, you have them at your fingers ends.

You are now in poſſeſſion of all thoſe claſſes which have the ſtamens free, ſeparate, diſunited. If a flower that has both ſtamens and piſtils ſhould preſent itſelf, in which you find the ſtamens united at bottom, it certainly belongs to one of the three next claſſes; and if on the contrary they are united at top, that is, the anthers form one body, it will belong to the nineteenth claſs.

In the ſixteenth claſs called *Monadelphia*, the filaments are united ſo as to form one regular membrane, at bottom; whilſt they are diſtinct at top. Of this character you have a clear and convincing inſtance, in that very common plant the Mallow. In ſome others however of this claſs the character is not ſo evident, and without a careful inſpection of the flowers to the very bottom, you might eaſily be tempted to give them to ano-

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(*c*) See Letter II.

ther claſs. Obſerve then farther, that the flower has always a calyx, and frequently a double one: that the corol conſiſts of five heart-ſhaped petals: that the receptacle of the fruit, as it is called, or the column to which the ſeeds are faſtened, projects above them in the centre of the flower: that the germs ſurround this in a ring: that all the ſtyles are united at bottom and form one body with the receptacle, but are divided at top into as many threads as there are germs: and that theſe germs grow into a kind of capſule divided into as many cells as there are piſtils, or conſiſting of the ſame number of *Arils*, which are looſe coats covering each ſeed ſeparately, and not eaſily falling from it.

In the ſeventeenth claſs, *Diadelphia*, the filaments are united at bottom; not however into one, but two bodies. Theſe flowers alſo have but one piſtil; the fruit is a *legume* or pod; and if I add that the flowers are papilionaceous, you will immediately diſcover that this is another claſs with which you are perfectly acquainted, and with the form of whoſe flowers you was ſo much delighted (*d*).

In the eighteenth claſs the filaments are united in three or more bundles, and the name of it is *Polyadelphia*. The union being

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(*d*) See Letter III.

generally at the bottom only, without extending up the filaments, and the flowers having no diſtinguiſhing character, you muſt pull out the ſtamens, in order to be certain that the plant belongs to this claſs. The names of the three laſt named claſſes ſignify literally one, two and three brotherhoods.

If inſtead of the filaments being joined at bottom, they are free and diſtinct, but the anthers are connected together, ſo as to form one body, then your plant will be found in the claſs *Syngeneſia*. But the flowers in this claſs being ſmall, and the above mentioned circumſtance not being the firſt that will ſtrike an examiner of flowers, it muſt be added that they are *compound*; and this one word is ſufficient to overcome the whole difficulty with you who know theſe flowers at firſt ſight, and have ſo frequently diſſected the florets and ſemiflorets which compoſe them (*e*).

Though in the four laſt claſſes the ſtamens have been in ſome ſort united, yet both in theſe and in all the former, they have been found detached from the piſtil, ſo at leaſt as that the one may be taken off from the plant without the other. But what if a flower ſhould occur to you, in which you

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(*e*) See Letter VI. Syngeneſia ſignifies *congeneration*, or union, of the anthers.

are unable to do this, but you find on the contrary that the ſtamens grow upon the piſtil itſelf? Then, I anſwer, it belongs to a claſs entitled *Gynandria*, which is the twentieth in the ſyſtem of Linnæus, and derives its name from this peculiar circumſtance, by which it ſtands inſulated as it were, and detached from all the others. From the ſingular poſition of the piſtils in this claſs, ariſes a ſingularity in the appearance and ſhape of the flowers in moſt of the genera: and ſometimes the receptacle is lengthened out in form of a ſtyle, and bears both ſtamens and piſtils upon it.

Hitherto you have been concerned with ſuch plants only as have flowers which I call Complete or Perfect, becauſe they have both ſtamens and piſtils. But a plant perhaps may have occurred to your obſervation, in which you have found theſe parts always in ſeparate, diſtinct flowers. In this caſe I beg leave to coin two words, and to call thoſe which have the ſtamens only *Staminiferous*, and thoſe which have the piſtils only *Piſtilliferous* flowers. Now when you find theſe, and theſe only on the ſame tree or plant, that tree or plant belongs to the twenty-firſt claſs in the arrangement of Linnæus, called by him *Monoecia*, a term ſignifying one houſe: the flowers of different kinds being produced in the ſame habitation, or on the ſame individual plant. Whereas in the following claſs, theſe Staminiferous and Piſtilliferous flowers are not merely ſeparate from each other, but are always found on diſtinct plants of the ſame ſpecies, and in other reſpects ſo alike, as not to be diſtinguiſhed when they are out of flower. The name of this claſs therefore is *Dioecia*, ſignifying two houſes, and implying that incomplete flowers only are found in different habitations, or on ſeparate trees or plants, never on the ſame.

There remains now only one poſſible caſe to provide for, in the arrangement of conſpicuous flowers, which is this. Suppoſe you find ſome flowers that are complete; and at the ſame time others which bear only ſtamens or piſtils, on the ſame plant with the complete flowers, or on different plants of the ſame ſpecies. There is a claſs, namely, the twenty-third, provided for the reception of ſuch plants, and it is entitled *Polygamia*, from this variety in the flowers.

For plants with inconſpicuous flowers, as being of leſs conſideration, there is only one claſs provided: and that is called *Cryptogamia*, from the circumſtance of the fructification being concealed, or not obvious to our eyes. For the flowers in the moſt perfect of theſe are hardly to be diſtinguiſhed without a glaſs, and in many not even with it; nay the moſt acute obſervers have not detected flowers in them all, though in all probability there is no vegetable without them. They will be eaſily known from plants with conſpicuous flowers, by their ſingular ſtructure; as you will readily acknowledge when I inform you that the objects of this, the loweſt claſs of vegetables, are Ferns, Moſſes, Sea-weeds, and Funguſes; and therefore when we talk of inconſpicuous flowers, we do not mean to include ſuch as are deſtitute of a magnificent corol, but ſuch only as have not the ſtamens and piſtils viſible to the naked eye. But you are too good an obſerver to require ſuch admonitions. By this time, dear Couſin, you are doubtleſs ſufficiently fatigued, as well as myſelf, with all this dry matter; and what is worſe, you have not learnt to find out one plant: but patience; we are in the way, and have made great progreſs, though we are not arrived at the end of our journey. We will ſoon make another long ſtage, unleſs you tell me you have enough, and in that caſe I promiſe to trouble you no more with this traſh, for if it does not amuſe and even intereſt you, throw it at once into the fire. Adieu, dear Couſin.

LETTER X.

May the 1ſt, 1774.

PRESUMING, dear Couſin, that you have already examined abundance of Spring Flowers, and determined their claſſes, upon the inſtructions contained in my laſt letter; I ſhall proceed in this to give you the characters of the orders, or diviſions of the claſſes. If you were to proceed at once to the examination of the ſpecies, all would be confuſion; juſt as if you attempted to eſtimate a vaſt mixt multitude, fluctuating in tumultuary diſorder: but if you have the patience to make a regular progreſs; to throw this multitude into large bodies, to ſubdivide theſe into ſmaller ones, and theſe again into others ſo ſmall as to command them well with the eye, you have at length a regular army, which you can number, arrange, and diſcipline at your pleaſure. We will now divide our twenty-four regiments into their reſpective companies. Here I think you will not find ſo much difficulty as in the claſſes. For the orders in the firſt thirteen claſſes, are founded wholly upon the *number* of the Piſtils, ſo that the chief of your taſk here will be to learn ſo many new terms, which are formed by putting *gynia* inſtead of *andria* to the greek words ſignifying the numbers: as *Monogynia*, one piſtil; *Digynia*, two piſtils; and ſo on.

After the firſt thirteen claſſes, we no longer uſe the piſtils for the purpoſe of ſubdividing the claſſes into orders. In the claſs *Didynamia* it would be nugatory, becauſe you have obſerved, that all the flowers of the ringent tribe, have one piſtil, and no more. Here then we have recourſe to another circumſtance, which anſwers extremely well. For we find that moſt of the plants which have a labiate flower, have four naked ſeeds at the bottom of the calyx; and that the perſonate flowers are ſucceeded by a capſule containing many ſmall ſeeds: hence ariſes an elegant, commodious, obvious, and natural diviſion of the fourteenth claſs into two Orders, *Gymnoſpermia* and *Angioſpermia*; the firſt containing all the ringent flowers with four naked ſeeds ripening in the calyx: the ſecond ſuch as have the ſeeds contained in a bilocular pericarp, or ſeed-veſſel of two cells, and faſtened to a receptacle in the middle of it.

In the next claſs, *Tetradynamia*, the flowers have alſo one piſtil and no more. Here again it is found convenient to take the fruit for the ſubdiviſion of it into orders. Theſe are called *Siliculoſa* and *Siliquoſa*, from the form of the fruit, which we call *Silicle* and *Silique*; having only the word *Pod* current in our language, which will not ſuffice to diſtinguiſh theſe from each other, nor from the Pod in the leguminous tribe. The plants of the firſt order then have a *Silicle* or ſhort roundiſh pericarp; thoſe of the ſecond a *Silique* or oblong narrow pericarp: both are bilocular, but the ſtructure has been already ſufficiently explained (*f*).

In the 16th, 17th, and 18th claſſes it is found beſt to take the orders from the number of ſtamens. Here then is no ſort of difficulty, and what is very pleaſant, you have no new terms to burden the memory.

The chief difficulty with reſpect to the Orders, lies in the claſs *Syngeneſia*. Tournefort's diviſion of the Compound Flowers into *Floſculous, Semifloſculous* and *Radiate* was pretty and obvious, but Linnæus's is abſtruſe and difficult. I will explain it to you however as clearly as I can. You are perfect miſtreſs of a compound flower, and the different ſorts of florets of which it is compoſed (*g*). I muſt next inform you therefore, that what you know by the name of Compound, is called by Linnæus a *Floſculous* flower; and that he calls the florets, *tubulous* floſcules, and the ſemi-florets, *ligulate* floſcules; this being premiſed, we may uſe the language of Linnæus or Tournefort as we pleaſe. Now if you examine theſe floſcules nicely, you will diſco-

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(*f*) See Letter II.
(*g*) See Letter VI.

ver that they have ſometimes both ſtamens and piſtil; but you will ſee that others have ſtamens only, others again a piſtil only; and laſtly, ſome have neither ſtamens nor piſtil: the firſt of theſe I call *perfect* * ſloſcules; the ſecond *ſtaminiferous*, the third *piſtilliferous*, and the fourth *neuter* ſloſcules. All theſe variations are to be found both in the tubulous and ligulate ſloſcules; and muſt be well attended to, becauſe on theſe variations, aſſiſted by the form of the florets, Linnæus has founded the four firſt orders of this claſs.

Polygamia Æqualis is the name of the firſt order. *Polygamia* is the family name, which this has in common with all the orders except the laſt; it is uſed only in oppoſition to *Monogamia*, and implies that there are many florets incloſed within one common calyx; which is your idea of a compound flower. The peculiar name *Æqualis* ſignifies equal, regular, or alike, and implies that the whole flower is regular, and that all the component ſloſcules therefore, whether tubulous or ligulate, are alike; and indeed they are not only ſo, but likewiſe perfect, or all furniſhed with ſtamens and piſtil; and therefore each followed by a ſeed. If theſe flowers have any ligulate ſloſcules, all the reſt are ſo; if any tubulous ſloſcules, all the reſt are ſo likewiſe, except in one genus, which has radiate flowers.

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* Perfect at leaſt in appearance, if not always really ſo.

In the ſecond order, *Polygamia Superflua*, all the florets of the diſk, centre or middle of the flower are perfect; thoſe of the ray or exterior part piſtilliferous. Both of them produce ſeed. Moſt of the flowers in this order are *radiate*, and then they are eaſily known, by the circumſtance of having fertile ſeeds both in the diſk and ray: but there are ſome which have tubulous florets only, and appear like the diſk of a radiate flower, as a Daiſy would look when ſpoiled of its white ſemi-florets; whence Ray called them *Diſcoid* flowers: in theſe however, on an attentive inſpection, you will diſcover that ſome of the outer ones are deficient in ſtamens at leaſt, if not in corol too. Theſe are by much the largeſt orders, each of them containing almoſt double the number of genera, that are in the three remaining orders of compound flowers taken together.

The third order of theſe compound flowers, or of the claſs *Syngeneſia*, is entitled *Fruſtranea*. The character of the order is, that the florets in the diſk or centre are perfect, and produce ſeed; whilſt thoſe of the ray are imperfect, and therefore abortive or fruſtrate, whence the name. This is a very ſmall order, containing only ſeven genera; of which ſix have radiate flowers, and the ſeventh, which however is a numerous one, has capitate flowers like the thiſtles, but differing from them in having either neuter or abortive florets next the calyx, as in the common Blue-bottle; in which the neuter floſcules diſtinguiſh themſelves by being much larger than the others; but on examination they are mere corol, and nothing elſe.

In the fourth Order, *Neceſſaria*, the florets in the diſk or middle are apparently perfect, but are not really ſo, and therefore produce no perfect ſeed, whilſt the piſtilliferous floſcules in the ray or outſide of the flower are fertile. All theſe have radiate flowers, except in two genera, wherein the exterior fertile florets have ſcarcely any corol.

In the fifth Order, *Polygamia Segregata*, there is a common calyx, as in the foregoing orders; but beſides that, there is in this order a partial one, including one or more florets, which are thus ſeparated from each other in a manner different from the reſt of the orders: and hence the name. By this order the Compound approach the Aggregate flowers; ſuch as the Teaſel, Scabious, &c. but then theſe have not the character of the claſs *Syngeneſia* in the union of the anthers.

The ſixth or laſt order is entitled ſimply *Monogamia*, becauſe it conſiſts of plants with *ſimple*, not compound flowers, which circumſtance is abundantly ſufficient to diſcriminate this order, provided you attend at the ſame time to the claſſical character.

We have now, dear Couſin, happily I hope, paſſed *the Fool's bridge*, and are arrived ſafely on the other ſide, where the way is plain, and we ſhall ſoon get pleaſantly to the end of our ſtage. In ſhort, the orders of the three following claſſes, *Gynandria, Monoecia and Dioecia*, being founded upon the ſtamens, and taking their names from the foregoing claſſes, according to the number, and union or diſunion of the ſtamens in the reſpective flowers; there is nothing new to be learnt in any of theſe.

The twenty-third claſs indeed, *Polygamia*, has three orders, ariſing from the triple mode in which the three ſorts of flowers may be arranged; either on the ſame plant, on two diſtinct plants, or on three. When the perfect and imperfect flowers are on the ſame plant, the order is entitled *Monoecia*. When the perfect flowers are on one plant, and the imperfect ones on a ſecond of the ſame ſpecies, the order is then entitled *Dioecia*. And when the perfect flowers are on one plant; ſtaminiferous ones on a ſecond, and piſtilliferous ones on a third, all of the ſame ſpecies; then ſuch plant belongs to an order called *Trioecia*, ſignifying three houſes; the three ſorts of flowers having three diſtinct habitations.

The laſt claſs having no flowers whoſe parts are diſcernible by the naked eye; and therefore called *Cryptogamia:* having alſo many genera in which we are uncertain what the fructification is; many in which we can diſcern no fructification at all: the characters of the orders can no longer be taken from the ſtamens and piſtils. Fortunately the plants of this claſs have a very particular ſtructure, ſerving very well both to aſcertain the claſſical character, and the diviſion of it into four Orders; which are called I. Filices or Ferns. II. Muſci or Moſſes. III. *Algæ*, or Sea-weeds, and IV. *Fungi* or Funguſes.

The *Ferns* moſtly have their fructification upon the backs of their leaves. This, when examined by the microſcope, appears to conſiſt of a ſcale ariſing from the leaf, and opening on one ſide; and under that, ſome little balls on pedicles, ſurrounded by an elaſtic ring; in due time the balls burſt, and throw out a fine duſt, which is ſuppoſed to be the ſeed. Linnæus makes the ſcale to be a calyx: and the globules are probably ſo many capſules or pericarps.

The *Moſſes* have ſmall threads growing out of the boſoms of the leaves, terminated by a ſmall body, the whole reſembling ſtamens: accompanied by little ſhorter threads ſuppoſed to be piſtils, ſometimes on the ſame plant with the former, and ſometimes on another. The firſt of theſe Linnæus took for anthers, and actually called them ſo; but he ſuſpected them afterwards to be capſules,

ſules, and ſuch they turn out to be, by a narrower inſpection with greater magnifiers.

Of the *Algæ* we know too little about the fructification to give a regular character of the order, which includes not only the ſea-weeds, but the liverworts, &c. theſe have been ranged by others among the Moſſes. In the latter, there are little bodies viſible enough, which are taken for ſtaminiferous and piſtilliferous flowers, diſtinct from each other; but experiments are yet wanting to aſcertain them with preciſion. On the former are little bladders, ſome hollow with hairs within, others filled with a gelly-like ſubſtance; and theſe are ſuppoſed to be the flowers and fruits.

If the *Funguſes* have any fructification, it is imagined to be underneath, in the gills, pores, &c. But I will not detain you with theſe dregs of vegetable nature, in which you will take no pleaſure, 'till you have imbibed an enthuſiaſtic paſſion for Botany.

After the claſs *Cryptogamia*, Linnæus has given the *Palms*, in a twenty-fifth claſs, or appendix, without any character. I preſume he has thus thrown them into the rear of his ſyſtem, partly becauſe he could not have ranged this proud ſet of trees according to his laws, without tearing them from each other; and partly becauſe they have not been examined with ſufficient accuracy; you will ſcarcely have an opportunity of examining this natural claſs, the moſt remarkable characters of which are, that the ſtaminiferous flowers are diſtinct from the piſtilliferous, on the ſame or different individuals; except in one genus, which has complete or perfect flowers accompanied by ſtaminiferous ones on the ſame individual; all proceeding from a *ſpathe* or ſheath, and growing upon a *ſpadix* (*h*). So that theſe trees belong to the three laſt claſſes of conſpicuous flowers in the artificial ſyſtem.

Thus, dear Couſin, we have accompliſhed our ſecond ſtage. And this letter not being of ſo unconſcionable a length as the former, I have accompanied it with two tables; one of the claſſical characters, and another explaining thoſe of the orders: that after reading my diffuſive explanation, you may have the whole under your eye at once; and thus perhaps at one view form a better idea of the arrangement of vegetables into claſſes and orders, than you could do from many

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(*h*) The *ſpadix* is the receptacle in this tribe, and has no Engliſh name. In another place, Linnæus, in diſtributing vegetables into nine nations, aſſigns the firſt to the Palms: calling them Princes of India, bearing their fructification on a *ſpadix*, within a *ſpathe*; flowing; remarkable for their prodigious height; diſtinguiſhed by an unvaried, undivided, perennial trunk; crowned at top by an evergreen buſh of leaves; rich in abundance of large, fine fruit.

detached pages (*i*). We are not yet arrived at ſpecific or individual information, but we are on the borders, as I ſhall convince you in my next letter. In the mean time you have ſufficient employment for your eyes and attention, without doors as well as within: for if you had taken up this traſh of mine only in your dreſſing-room, you would long ſince have thrown it into the fire; if it meets with a better fate, I owe it merely to the beautiful objects which your fair hands have cropt in the garden and fields. Always give the preference to the latter where you can, both for the ſake of exerciſe, and having your plants in their natural ſtate. Adieu, dear Couſin; continue your kind indulgence to my prate.

(*i*) See Curtis's beautiful explanation of Linnæus's Syſtem of Botany, with coloured plates. And an Illuſtration of the Syſtem of Linnæus, by John Miller; who has given a plate of one genus, in every claſs and order. Lond. 1779, octavo.

[To face the blank page 114.]

The Outlines of LINNÆUS's Syſtem of Vegetables.

- A. Plants with conſpicuous Flowers.
  - B. 1. All complete, or furniſhed with Stamen and Piſtil.
    - C. With Stamens ſeparate from the Piſtil.
      - D. And ſeparate from each other.
        - E. All of the ſame length, or not proportionably longer than each other.
          - F. In which the number only is to be conſidered.
            - I. MONANDRIA. One Stamen.
            - II. DIANDRIA. Two Stamens.
            - III. TRIANDRIA. Three Stamens.
            - IV. TETRANDRIA. Four equal Stamens.
            - V. PENTANDRIA. Five Stamens.
            - VI. HEXANDRIA. Six equal Stamens.
            - VII. HEPTANDRIA. Seven Stamens.
            - VIII. OCTANDRIA. Eight Stamens.
            - IX. ENNEANDRIA. Nine Stamens.
            - X. DECANDRIA. Ten Stamens.
            - XI. DODECANDRIA. From eleven to nineteen Stamens incluſive.
          - F. In which the Situation is alſo to be conſidered.
            - XII. ICOSANDRIA. About twenty Stamens on the Calyx or Corol.
            - XIII. POLYANDRIA. Twenty Stamens or more on the receptacle or baſe of the Flower.
        - E. Some Stamens proportionably longer than others.
          - XIV. DIDYNAMIA. Four Stamens, two longer. One Piſtil. Flowers ringent.
          - XV. TETRADYNAMIA. Six Stamens, four longer. One Piſtil. Flowers cruciform.
      - D. Stamens coherent at bottom only, or by the Filaments.
        - XVI. MONADELPHIA. Filaments united into one body.
        - XVII. DIADELPHIA. Filaments in two bodies. Corol papilionaceous.
        - XVIII. POLYADELPHIA. Filaments in three or more parcels.
      - D. Stamens coherent at top only, or by the Anthers.
        - XIX. SYNGENESIA. Anthers united, 5 Filam. diſtinct, 1 Piſtil, Flowers compound.
    - C. With Stamens growing out of the Piſtil itſelf.
      - XX. GYNANDRIA. Stamens on the Piſtil inſtead of the Receptacle.
  - B. 2. All incomplete; or which have Stamens only, or Piſtils only.
    - XXI. MONOECIA. Each ſort of Flower ſeparate, but on the ſame Plant.
    - XXII. DIOECIA. Each ſort of Flower, on diſtinct Plants only.
  - B. 3. Flowers of the firſt ſort, together with one or both of the ſecond ſort.
    - XXIII. POLYGAMIA.
- A. Flowers inconſpicuous.
  - XXIV. CRYPTOGAMIA. Flowers very ſmall, inviſible, or not yet diſcovered.
  - XXV. PALMS. Flowers born on a *Spadix*, and within a *Spathe*, moſtly incomplete.

Sketch and Explanation of the Orders in the Syſtem of Linnæus.

I. Monandria. *One ſtamen.*
  1. Monogynia. *One piſtil.*
  2. Digynia. *Two piſtils.*
II. Diandria. *Two ſtamens.*
  1. Monogynia. *One piſtil.*
  2. Digynia. *Two piſtils.*
  3. Trigynia. *Three piſtils.*
III. Triandria. *Three ſtamens.*
  1. Monogynia. *One piſtil.*
  2. Digynia. *Two piſtils.*
  3. Trigynia. *Three piſtils.*
IV. Tetrandria. *Four equal ſtamens.*
  1. Monogynia. *One piſtil.*
  2. Digynia. *Two piſtils.*
  3. Tetragynia. *Four piſtils.*
V. Pentandria. *Five ſtamens.*
  1. Monogynia. *One piſtil.*
  2. Digynia. *Two piſtils.*
  3. Trigynia. *Three piſtils.*
  4. Tetragynia. *Four piſtils.*
  5. Pentagynia. *Five piſtils.*
  6. Polygynia. *Many piſtils.*
VI. Hexandria. *Six equal ſtamens.*
  1. Monogynia. *One piſtil.*
  2. Digynia. *Two piſtils.*
  3. Trigynia. *Three piſtils.*

   4. Tetragynia. *Four piſtils.*
   5. Polygynia. *Many piſtils.*
VII. Heptandria. *Seven ſtamens.*
   1. Monogynia. *One piſtil.*
   2. Digynia. *Two piſtils.*
   3. Tetragynia. *Four piſtils.*
   4. Heptagynia. *Seven piſtils.*
VIII. Octandria. *Eight ſtamens.*
   1. Monogynia. *One piſtil.*
   2. Digynia. *Two piſtils.*
   3. Trigynia. *Three piſtils.*
   4. Tetragynia. *Four piſtils.*
IX. Enneandria. *Nine ſtamens.*
   1. Monogynia. *One piſtil.*
   2. Trigynia. *Three piſtils.*
   3. Hexagynia. *Six piſtils.*
X. Decandria. *Ten ſtamens.*
   1. Monogynia. *One piſtil.*
   2. Digynia. *Two piſtils.*
   3. Trigynia. *Three piſtils.*
   4. Tetragynia. *Four piſtils.*
   5. Pentagynia. *Five piſtils.*
   6. Decagynia. *Ten piſtils.*
XI. Dodecandria. *Twelve ſtamens,* (from 11 to 19.)
   1. Monogynia. *One piſtil.*
   2. Digynia. *Two piſtils.*
   3. Trigynia. *Three piſtils.*
   4. Pentagynia. *Five piſtils.*
   5. Dodecagynia. *Twelve piſtils.*
XII. Icoſandria. *Twenty ſtamens,* (on the calyx or corol.)

1. Monogynia. *One piſtil.*
2. Digynia. *Two piſtils.*
3. Trigynia. *Three piſtils.*
4. Pentagynia. *Five piſtils.*
5. Polygynia. *Many piſtils.*

XIII. Polyandria. *Many ſtamens,* (from 20 to 1000, on the receptacle.)

1. Monogynia. *One piſtil.*
2. Digynia. *Two piſtils.*
3. Trigynia. *Three piſtils.*
4. Tetragynia. *Four Piſtils.*
5. Pentagynia. *Five piſtils.*
6. Hexagynia. *Six piſtils.*
7. Polygynia. *Many piſtils.*

XIV. Didynamia. *Four ſtamens,* 2 *longer and* 2 *ſhorter.*

1. Gymnoſpermia. *Four naked ſeeds.*
2. Angioſpermia. *Seeds incloſed in a pericarp.*

XV. Tetradynamia. *Six ſtamens,* 4 *longer and* 2 *ſhorter.*

1. Siliculoſa. *Pericarp generally roundiſh, with the ſtyle perſiſtent or continuing,* called a Silicle.
2. Siliquoſa. *Pericarp very long and narrow, called a* Silique *or* Pod.

XVI. Monadelphia. *One Brotherhood:* or *filaments all connected.*

1. Triandria. *Three ſtamens.*
2. Pentandria. *Five ſtamens.*
3. Octandria. *Eight ſtamens.*
4. Decandria. *Ten ſtamens.*

5. Endecandria. *Eleven ſtamens.*
6. Dodecandria. *Twelve ſtamens.*
7. Polyandria. *Many ſtamens.*

XVII. Diadelphia. *Two Brotherhoods: or filaments in two bodies.*
1. Pentandria. *Five ſtamens.*
2. Hexandria. *Six ſtamens.*
3. Octandria. *Eight ſtamens.*
4. Decandria. *Ten ſtamens.*

XVIII. Polyadelphia. *Many Brotherhoods: filaments in three or more parcels.*
1. Pentandria, *Five Stamens.*
2. Dodecandria. *Twelve Stamens.*
3. Icoſandria. *Twenty ſtamens.*
4. Polyandria. *Many ſtamens.*

XIX. Syngeneſia. *Congeneration. Anthers united.*
1. Polygamia Æqualis. *All the floſcules perfect, and the whole flower regular.*
2. *Polygamia ſuperflua. Perfect floſcules in the diſk: piſtilliferous floſcules in the ray: both producing ſeed.*
3. Polygamia Fruſtranea. *Floſcules in the diſk perfect, and producing ſeed: in the ray imperfect, and without ſeed.*
4. Polygamia Neceſſaria. *Floſcules in appearance perfect in the diſk, producing no ſeed; piſtilliferous floſcules in the ray producing ſeed.*
5. Polygamia Segregata. *Many floriferous calyxes contained in one common calyx, and forming one flower.*
6. Monogamia. *Flowers not compound, as*

as in the other orders, but ſimple, as in all the other claſſes.

XX, Gynandria. *Stamens growing on the Piſtil.*
1. Diandria, *Two ſtamens.*
2. Triandria. *Three ſtamens.*
3. Tetrandria. *Four ſtamens.*
4. Pentandria. *Five ſtamens.*
5. Hexandria. *Six ſtamens.*
6. Octandria. *Eight ſtamens.*
7. Decandria. *Ten ſtamens.*
8. Dodecandria. *Twelve ſtamens.*
9. Polyandria. *Many ſtamens.*

XXI. Monoecia. *One Houſe. Imperfect flowers ſeparate on the ſame plant.*
1. Monandria. *One ſtamen.*
2. Diandria. *Two ſtamens.*
3. Triandria, *Three ſtamens.*
4. Tetrandria. *Four ſtamens.*
5. Pentandria. *Five ſtamens.*
6. Hexandria. *Six ſtamens.*
7. Heptandria. *Seven ſtamens.*
8. Polyandria. *Many ſtamens.*
9. Monadelphia. *Filaments united in one.*
10. Syngeneſia. *Anthers united.*
11. Gynandria. *Stamens on the piſtil.*

XXII. Dioecia. *Two houſes. Imperfect flowers on diſtinct individuals.*
1. Monandria. *One ſtamen.*
2. Diandria. *Two ſtamens.*
3. Triandria. *Three ſtamens.*
4. Tetrandria. *Four ſtamens.*
5. Pentandria. *Five ſtamens.*

6. Hexandria. *Six ſtamens.*
7. Octandria. *Eight ſtamens.*
8. Enneandria. *Nine ſtamens.*
9. Decandria. *Ten ſtamens.*
10. Dodecandria. *Twelve ſtamens.*
11. Polyandria. *Many ſtamens.*
12. Monadelphia. *Filaments united in one.*
13. Syngeneſia. *Anthers united.*
14. Gynandria. *Stamens on the piſtil.*

XXIII. Polygamia. *Perfect flowers, accompanied with one or both ſorts of imperfect flowers.*

1. Monoecia. *Perfect and imperfect flowers on the ſame plant.*
2. Dioecia. *Perfect flowers on one plant, and imperfect on another.*
3. Trioecia. *Perfect flowers on one plant, ſtaminiferous flowers on a ſecond, and piſtilliferous flowers on a third.*

XXIV. Cryptogamia. Fructification ſecret.

1. Filices. *Ferns: bearing ſeed on the back of the leaves.*
2. Muſci. *Moſſes: having imperfect flowers diſtinct, and the ſeeds in a capſule, often covered with a veil.*
3. Algæ. *Having imperfect flowers diſtinct, and the ſeeds either like a meal on the leaves or incloſed in bladders.*
4. Fungi. *Having no diſcernible flowers, but ſeeds in the gills, pores, cups, &c.*

XXV. Palmæ: *Palms. Flowers on a ſpadix, in a ſpathe or ſheath: generally ſtaminiferous and piſtilliferous diſtinct.*

LETTER XI.

June the 10th, 1774.

AT length, dear Couſin, I am going to put you in the way of examining plants by yourſelf, and determining the genus and ſpecies, as you have before done the claſs and order. You have been already initiated, in my firſt letters; but now I ſhall proceed in more form, and preſent you with one plant or more of each claſs; explaining to you as we go along ſome others of the natural claſſes; which form, or are contained in the artificial ones.

The firſt claſs, *Monandria*, in the Syſtem of Linnæus, is a very ſmall one; compriſing, as you have ſeen already, in the ſecond table which I ſent you, but two orders. There are alſo but eighteen *genera* in it, and forty-four ſpecies. Very few of theſe plants are natives of Europe; and the Indian ſorts are not eaſy to be met with, at leaſt in flower, in the beſt hot-houſes.

There is a plant however not very uncommon in ponds, ditches, and ſlow muddy ſtreams, called *Hippuris*, which is of this claſs, and of the firſt order. It has a ſingle jointed ſtalk, and at each joint is a dozen leaves or more, placed all round in a whorl, which is a form that Linnæus calls *verticil-*

late. To each of theſe leaves, cloſe to the ſtalk, belongs a little flower, conſiſting of a ſingle ſtamen and piſtil, one ſeed, and nothing more; for it has neither calyx nor corol. You will find the ſtamen ſitting on the baſe or receptacle of the flower, terminated by a bifid anther; and behind this is the piſtil, the germ of which is oblong, and ſtands upon the receptacle; the ſtyle is longer than the ſtamen, and is terminated by a ſingle ſharp ſtigma. This will be amply ſufficient for you to determine the *Hippuris* (*a*), which perhaps may not grow near you, and if it does, you muſt not hazard wetting and dirtying yourſelf in a muddy ditch. Since therefore it is abundant in the moat of the neighbouring abbey, I have incloſed ſome ſpecimens of it in my tin pocket caſe, which may ſerve afterwards to bring home your plants freſh and cool, if you are not already provided with ſo neceſſary a thing. If you are not ſtruck with the beauty of the *Hippuris*, you will at leaſt eſteem it for its modeſty and ſimplicity. I have one favour to aſk in return for my tin box and its contents; which is, that whenever you call this plant by its name, you will pronounce the middle ſyllable long, and not ſhort, as

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(*a*) I do not know that this plant has been noticed enough to have a common name in Engliſh. In the books it is called *Female Horſe-tail* or *Mare's-tail*; names ridiculous enough.

many do: for I am ſollicitous to pronounce, as well as think like you. I have ſaid nothing here of the diſtinction between genus and ſpecies, becauſe there is only one ſort of *Hippuris*. I muſt however inform you once for all, that we invariably take the characters of the genera from the parts of fructification; and thoſe of the ſpecies from the other parts of the plant, particularly the leaves.

There is another plant of this claſs and order, which your gardener may poſſibly have in the hot-houſe. I dare ſay you know it by the upright growth, reedy appearance, and fine ſcarlet flowers. Perhaps you have already found ſome difficulty in determining the claſs and order; for there is no filament, but the anther grows to the edge of a kind of petal, which Linnæus calls the *Nectary*: the ſtyle alſo, which is lance-ſhaped, grows to the ſame petal. The calyx conſiſts of three leaves: the corol is cut into ſix parts, five erect, and the ſixth reflexed; the ſeeds are contained in a capſule or veſſel of three cells, are round and very hard; whence this plant has the name of *Indian Shot*. Linnæus calls it *Canna*. Thus much for the *genus*, of which there are three ſpecies at leaſt; ſome make five. Linnæus has diſtinguiſhed his three ſpecies thus. 1. Canna indica; by its ovate leaves, ſharp-pointed towards both ends, and marked with nerves. 2. C. anguſtiguſtifolia, *narrow-leaved Indian-ſhot,* by its lance-ſhaped, petiolate leaves, marked alſo with nerves. 3. C. glauca, *ſea-green Indian-ſhot,* by its lance-ſhaped petiolate leaves, ſmooth or without nerves. Yours will be one of the two firſt ſpecies, for the laſt has yellow flowers. This order contains ſeveral intereſting plants, ſuch as Ginger, Cardamom, Grain of Paradiſe, Arabian Coſtus, Turmerick, Galangale, &c. all which, with *Canna,* belong to a natural tribe entitled *Scitamineæ,* from the latin word *ſcitum,* which when tacked to *edulium* implies eatables of a pleaſant taſte. They have not only the ſame place in the artificial ſyſtem, but they agree farther in having their ſeeds encloſed in a veſſel below the receptacle, as you perceive plainly it is in the *Canna:* the diviſions alſo of the calyx, corol and ſeed-veſſel are uſually three.

Short flights are beſt, 'till you have tried your wings. My next may poſſibly be a little longer, if you give me leave. Adieu for a few days.

LETTER XII.

June 17th, 1774.

YOU have ſtarved a week, dear Couſin, upon the meagre fare of my laſt; I can now promiſe you more variety, having a larger range and better choice. The ſecond claſs of plants, *Diandria,* has 35 genera, and 269 ſpecies.

Linnæus has done every thing in his power to facilitate the inveſtigation of plants; and nothing contributes more to this than the clearneſs and order of his arrangement, and his leading on the ſtudent by regular ſteps from generals to particulars. Thus, after you have ſettled the claſs and order of your plant, you perceive that each order, when numerous, is thrown into ſeveral great diviſions, before you are preſented with the generic characters. This ſhortens your enquiry conſiderably, for in the firſt order of this claſs, inſtead of having the characters of thirty-five genera to chooſe out of, you have by this means only eight or nine, or perhaps no more than three, or even one. That you may underſtand this the better, I will give you Linnæus's ſubdiviſion of the firſt order of this claſs.

Diandria Monogynia.

1. Flowers inferior, monopetalous, regular: 8 genera.
2. ——— inferior, monopetalous, irregular: with ſeeds incloſed in a veſſel: 9 genera.
3. ——— inferior, monopetalous, irrregular: with naked ſeeds: 9 genera.
4. ——— inferior, pentapetalous: 1 genus.
5. ——— ſuperior: 3 genera.

So that if your plant happens to belong to the fourth diviſion, it is determined at once; and in all the reſt your ſearch is much facilitated (*b*).

In this claſs, though by no means one of the moſt numerous, you will not be at a loſs, either in your garden, or in the fields, for examples.

You are well acquainted with moſt ſorts of Jaſmine. Take any one of them, and you will perceive immediately that it belongs to the firſt diviſion of the firſt order. Compare as many of the ſpecies as you can meet with in flower, and you will find that they all agree in the characters of it.

But other circumſtances are to be found in them all, called *generic characters:* theſe in the

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(*b*) It is not neceſſary to be more particular with the Engliſh reader, ſince the Botanical Society at Lichfield have publiſhed a tranſlation of Linnæus's Syſtem of Vegetables.

the preſent caſe are: that the corol is monopetalous, ſalver-ſhaped (*c*), and the border divided into five ſegments: the anthers ſmall, and lying within the tube of the corol: the ſeed-veſſel a berry of two cells: and the ſeeds covered with an *aril* or looſe coat.

Having ſeen in what all the Jaſmines agree, to determine the claſs, order, with its diviſions, and genus; now attend to the circumſtances in which they differ, to ſettle the ſix ſpecies. For this the leaves will nearly ſuffice: thus,

1. Leaves pinnate, oppoſite: lobes diſtinct. *Jaſmine officinal.*
2. Leaves pinnate, oppoſite: lobes confluent. *J. Catalonian.*
3. Leaves ternate, oppoſite. *J. Azorian.*
4. Leaves ternate and ſimple, alternate: branches angulate: *J. ſhrubby.*
5. Leaves ternate and pinnate, alternate, acute: branches angulate. *J. dwarf.*
6. Leaves ternate and pinnate, alternate, obtuſe: branches round. *J. ſweet-ſcented.*

(*c*) If the reader is at a loſs for the meaning of terms, there is no want of books to conſult; ſuch as Lee's and Roſe's Introductions, Berkenhout's Dictionary, Milne's Inſtitutes, &c.

The three firſt have the corol white; in the three laſt it is yellow. If you enquire after your favorite *Arabian Jaſmine*, it belongs to another genus, *Nyctanthes*, becauſe it has the calyx and corol divided into eight ſegments. The *Cape Jaſmine* is of another claſs, the fifth; and of courſe has another name, *Gardenia*.

Several other trees and ſhrubs belong to this ſame firſt diviſion. *Privet*, *Phillyrea*, *Olive*, and the *Lilacs*. Theſe have all a quadrifid corol; and are diſtinguiſhed by their fruit, which in Privet is a *berry* with 4 ſeeds; in Phillyrea a *berry* with 1 ſeed; in Olive a *drupe*; in the Lilacs a bilocular *capſule*. The common Lilac has heart-ſhaped leaves, a circumſtance ſufficient to diſtinguiſh it from the Perſian, which has lance-ſhaped leaves. As to the different colours of the flowers in the firſt—white, blue and red, they form but varieties: colour being rarely permanent enough to conſtitute ſpecific differences.

In the ſecond diviſion is a genus, named from a female ſaint, *Veronica*: it is a very numerous one, containing no leſs than 37 ſpecies. Here therefore Linnæus has done with the genus, as he did before with the order—he has thrown it into three principal diviſions from the manner of flowering. 1. Such as bear the flowers in ſpikes. 2.

2. Such as bear them in racemes or bunches.
3. Such as produce them ſingly.

This genus is eaſily known by the monopetalous, rotate or wheel-ſhaped corol, divided into four ſegments, the loweſt of which is narrower than the reſt; and the bilocular, heart-ſhaped, flatted capſule.

One ſpecies is very common among buſhes and in the hedges of paſtures. Its beautiful blue flowers have doubtleſs attracted your notice, and in falling off too eaſily, have given occaſion perhaps to many a leſſon on the ſhort duration of our enjoyments, or the fleeting nature of female charms, to your lovely daughter. If it is not already paſt flowering, for May is its ſeaſon, you will find that it belongs to the ſecond diviſion; or even if it is, the oval, wrinkled leaves, indented about the edge, and ſitting cloſe to the ſtalk, together with the weak trailing ſtems, unleſs upheld by the buſhes, will ſo clearly point out this humble plant to you, that you cannot well be miſtaken (*d*).

If this ſpecies however is out of blow, you will certainly find another in dry paſtures or heaths, eſpecially upon old ant-hills: it may perhaps have eſcaped you; the flowers being ſmall, and of a pale colour; not however

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(*d*) Veronica Chamædrys. Wild Speedwell or Germander.

without their beauty, on a nearer ſurvey. This belongs to the firſt diviſion; having the flowers growing in ſpikes, coming out chiefly from the ſide of the plant, at ſome diſtance from the main ſtem; the leaves are oppoſite, and the ſtalks trail along the ground. It has the trivial name of officinal, becauſe an infuſion of it is ſometimes uſed medicinally.

Other ſpecies are common by the ſides of ditches and brooks, whence they have the name of *Water Speedwell* or *Brooklime:* theſe are of the ſecond diviſion: and three ſpecies of the third diviſion are abundant among corn, in the ſpring.

I know not how it is, but there is a connection between this claſs, and the fourteenth. *Pinguicula* or *Butterwort* has a perſonate flower. Some ſpecies of *Vervain* have two ſtamens, others four of unequal lengths; among the latter is our *common* or *officinal Vervain*; whence ſome authors have removed it to the claſs *Didynamia*. *Sage*, *Roſemary* and others have labiate flowers, and in every reſpect ſo reſemble the plants of the fourteenth claſs, that they ſhould naturally be placed there; but having only two ſtamens, the artificial ſyſtem ranges them in this claſs. Sage ſeems to form the connecting link between the two claſſes, for in this genus are rudiments of another pair of ſtamens, but without anthers. The ſtructure of the ſtamens in the Sage is ſingular, and merits your obſervation. The two filaments are very ſhort, but two others are faſtened to theſe tranſverſely by the middle, and at one end of theſe laſt is a gland, at the other an anther. This circumſtance diſtinguiſhes the genus from all others, and is called its eſſential character. If you compare the flowers of Sage and Roſemary together, you will find them agree in moſt other particulars; but Roſemary has not this character: it has very long filaments, bending towards the caſque or upper lip of the corol.

The genus *Salvia* or *Sage* has no leſs than 39 ſpecies. Our common garden Sage (*e*), of which there are ſeveral varieties, has the flowers growing in ſpikes, the ſegments of the calyx acute, and the leaves of an oblong ovate form, entire, and very ſlightly notched about the edges. There are two ſorts commonly wild in Europe (*f*); not very unlike each other; but rather *Clarys* than *Sages*. You will be at no loſs to know them when you ſee them. To diſtinguiſh them from each other obſerve that *Meadow Clary* (*g*) has the leaves oblong-heart-ſhaped and notched about the edges; the upper ones

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(*e*) Salvia officinalis *Linnæi.*

(*f*) Salvia pratenſis & verbenaca; but the latter only is common in England.

(*g*) Salvia pratenſis.

embracing the ſtalks: the flowers grow in almoſt naked whorls, and the upper lip of the corol is glutinous. The *Wild Clary* (*h*) has the leaves ſerrate or ſinuate, and ſmoothiſh: the tube of the corol very ſmall in compariſon with the calyx, which opens wide.

But enough for our ſecond excurſion, eſpecially as I propoſe that we ſhould take a third very ſoon.

(*h*) Salvia verbenaca.

LETTER XIII.

June the 24th, 1774.

I HAVE haſtened this letter, dear Couſin, leſt the induſtrious mower ſhould have ſpoiled our harveſt. The brilliancy of the preſent ſeaſon will perhaps have quickened his ſteps: but at the worſt, he will have left you ſome gleanings about the hedges.

The tribe which I now recommend to your examination, is the moſt known and general of any; it is the moſt pleaſant to the eye, and of the moſt extended uſe, ſince it furniſhes man with the beſt portion of his nouriſhment, and at the ſame time is the whole ſupport of many among the beaſts, and of a large proportion of birds. The moſt rigid critic cannot accuſe us of miſſpending our time, when we are engaged in the contemplation of ſo uſeful a tribe of plants as that which contains all the different ſpecies of corn and graſſes.

The former being larger, requiring more care and culture, becauſe they are annual, and being immediately neceſſary to the ſupport of man, and the animals about him, in this and many other countries; the ſpecies are univerſally known and diſtinguiſhed. But this is not the caſe in the latter: graſs vulgarly forms one ſingle idea; and a huſbandman when he is looking over his incloſure, does not dream that there are upwards of 300 ſpecies of graſs, of which thirty or forty may be at preſent under his eye. They have ſcarcely had a name beſides the general one, 'till within theſe twenty years; and the few particular names that have been lately given, are far from having obtained general uſe: ſo that we may fairly aſſert that the knowledge of this moſt common and valuable tribe of plants is yet in its infancy (*i*).

Let us not however give more importance to Botany than it really has (*k*); but proceed quietly with our own buſineſs. The greater part of the world ſcarcely know that Graſs has a flower; or if they are ſhown it, will coldly aſk—And is this all? And yet graſs not only has a flower, but every conſtituent part of it; which is more than we can ſay of a tulip, and ſome others, that have engroſſed almoſt all the attention of mankind: nay there is ſuch a variety in the parts, diſ-

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(*i*) The late excellent Mr. Stillingfleet firſt directed the public attention to *Graſſes*; and that moſt reſpectable and uſeful inſtitution, the Society of Arts, &c. has done all in its power to promote an improvement in the culture of them; but without great effect. Nor can much be expected 'till œconomical gardens or public farms are inſtituted, for the purpoſe of experiments in this and other parts of huſbandry. It is not enough to tell men of a good thing, and inſtruct them how it may be done; but they muſt actually ſee it put in execution, and be eye witneſſes of its good effects.

(*k*) See Letter VII. at the beginning.

poſition and manner of flowering, that we have ſufficient marks in the fructification to diſtinguiſh about forty genera.

If you take up a ſpike or panicle of graſs, you may perhaps be diſappointed in your expectation of diſcerning the ſtamens and other parts; be aſſured then that the flower is not yet open, and continue your ſearch 'till you find one with the parts expanded, the ſlender filaments hanging out, and large, oblong, double anthers playing freely about with the ſlighteſt motion. You will immediately perceive that your graſs having three of theſe ſtamens, muſt range under the third claſs, *Triandria*, provided the flower has a piſtil as well as ſtamens. Searching a little farther, you will eaſily detect two feathered, reflexed ſtyles, each terminated with a feathered ſtigma: you are at no loſs therefore to determine, that your graſs belongs to the ſecond order (*Digynia*) of this third claſs.

Having thus ſettled the claſs and the order, you will proceed to the other parts of the flower. The neglected chaff you will find to be double; the outer generally conſiſting of two leaflets, one large and gibbous, the other ſmaller and flat; the inner conſiſting alſo of two parts or valves, which you may call petals—for this is the corol, and the former is the calyx. Nay this deſpiſed flower has even its *nectary*; which is a little oblong body compoſed of two leaflets, but ſo ſmall as to require a glaſs to diſcern it well. Graſſes have no *pericarp*, but one naked ſeed, with the ſhape of which we are well acquainted—it is oblong, and draws to a point towards each end. Theſe characters you will find common to every graſs you examine, and alſo to every ſpecies of corn; or however with very few exceptions: this then is called the *claſſical character*. As theſe ſmall flowers grow frequently two or more cloſe together, you have only to ſeparate a ſingle flower, to avoid confuſion in your examination.

But this tribe of plants does not agree in the parts of fructification only, as above deſcribed. The whole appearance, the general air, the manner of growth is the ſame in all. A ſimplicity of ſtructure runs through the entire claſs. Every one has a ſimple, unbranched, ſtraight, hollow ſtem, ſtrengthened with knots at certain intervals (*l*). There is none but has a ſingle leaf to each knot, inveſting or ſheathing the ſtem to ſome diſtance, and then ſpreading out into a long narrow ſurface, of equal breadth all the way, 'till it approaches the end, when it draws off gradually to a point (*m*). It is alſo invariably entire in every ſpecies; and

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(*l*) Linnæus names it *Culmus*.

(*m*) Linnæus calls this ſort of leaf *linear*.

without veins or branching veſſels, being only marked longitudinally with lines parallel to the ſides, and to a nerve or ridge that runs the whole length of it. There is another curious circumſtance, almoſt peculiar to this tribe of plants, and common to them all; namely, that the body of the ſeed does not ſplit into two lobes, but continues entire (*n*), 'till it has accompliſhed its purpoſe of giving the young plant its firſt nouriſhment, and then rots away: this you may eaſily obſerve as corn is ſpringing up; or you may ſow a little canary graſs ſeed, which you have for your birds, in a garden-pot in your window, and thus make the obſervation at home. But though I may indulge you for once, you know I do not encourage this idle domeſtic manner of obſerving the operations of nature. You muſt go abroad, and view her ſeated on her native throne: and in her Court you have this advantage, which you will find in no other, that you are gathering health, whilſt you pay her homage.

If you are now miſtreſs of all the circumſtances in which this tribe of plants agree, you may proceed to thoſe in which they differ, and thus ſeparate them firſt into their genera, and then into their ſpecies. But the genera being numerous, it may not be

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(*n*) Such plants are called *monocotyledonous*; the others *dicotyledonous*.

be inconvenient, as we did once before, to throw the whole tribe into ſome general ſubdiviſions; and that we can eaſily do from the manner in which the flowers are produced—either in a panicle or ſpike; and ſingly, or ſeveral together. Hence we ſhall get four ſubdiviſions:

1. Flowers ſingle — — 14 genera.
2. Flowers two together — 2 genera.
3. Flowers many together - 7 genera.
   Theſe are moſtly panicled: in all, the flowers are irregularly diſpoſed, or *wandering*, as Linnæus calls them.
4. Flowers in a ſpike, with a ſubulate receptacle — — — 6 genera.
   Including wheat, rie and barley. Oat is in the third diviſion.

Your pot of Canary ſeed, if you do not pull up all the plants to verify what I told you before, will ſerve for an inſtance of the firſt diviſion. When it arrives at a ſtate of perfection, you will obſerve that the two leaves of the calyx are flatted, boat-ſhaped, have a keel running along them, and are equal in length; the corol is leſs than the calyx, and incloſed within it. This is the character of the genus. It is ſpecifically diſtinguiſhed by the form of the panicle reſembling a ſpike, and being ovate, the chaffs being turgid and hairy, but the keel ſmooth. It is an annual graſs: is found wild in the Canary Iſlands, whence its name of *Phalaris Canarienſis*, and is cultivated in Europe for the food of Canary and other ſmall Birds.

Whilſt your Canary-graſs is growing, you muſt go out in ſearch of other inſtances of this firſt diviſion; for I muſt abſolutely inſiſt that you ranſack the neighbouring meadows and paſtures before the furious ſcythe has levelled all their honours.

Meadows of a good quality abound in *Fox-tail graſs* (*o*), which is indeed one of the moſt excellent for hay and feeding cattle. This genus is an exception to one of the general characters; for though the calyx has two valves or leaves, the corol has but one. You will readily diſcover the ſpecies by the cylindric ſhape, and hoary appearance of the panicle, which from its form you would take for a ſpike, the erectneſs of the ſtalk, and the corols not being bearded.

Cat's-tail graſs (p) is another of theſe; the ſpike has not the ſmooth hoary appearance of the laſt, but ſeems rough, and is known at firſt ſight by the truncated and forked termination of the calyxes, which are alſo linear, and ſit cloſe to the ſtem. The

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(*o*) Alopecurus pratenſis Linnæi.
(*p*) Phleum pratenſe. *Lin.*

corol is ſhut up within the calyx. The ſhape of the ſpike is cylindric; the keel of the chaffs is ciliate (q); and the ſtalk is erect. The ſpike of Cat's-tail graſs is ſometimes four inches long in moiſt meadows, in dryer, poorer ſoils, it decreaſes in length, until it dwindles to half an inch, and even leſs in hard barren ground, ſuch as way-ſides, and heaths. In theſe laſt, it cannot raiſe itſelf upright; and the roots, not being able to ſpread themſelves freely, grow knotty and bulbous. I mention theſe circumſtances, that you may be aware of the changes wrought in plants by ſoil and ſituation; and not ſuppoſe that a new ſpecies preſents itſelf, every time you meet with theſe and other ſlight variations. If you tranſplant from the heath into your garden, a dwarf, crooked, knobby-rooted plant; I dare engage that the ſtem will become erect, that the ſpike will lengthen, and the bulbous root change to a fibrous one. It is not however always eaſy to ſay what is a ſpecies, and what a variety only. A great deal of obſervation and experience is neceſſary in many caſes to determine this with preciſion. Moſt varieties indeed are produced by culture, or a change from their native ſoil and ſituation: and when they regain their natural ſtate, will return to their priſtine form: if this were univerſally ſo, there would be no difficulty to aſcertain the ſpecies from the variety. But it ſometimes happens that when accident has produced a variety, it continues permanent, and having once taſted a poliſhed ſituation, refuſes to return to a ſtate of nature: our teſt therefore is not a certain one.

(q) Set with little hairs like the eye-laſhes.

The ſecond diviſion of the Graſſes having only two genera; the diſtinction is eaſy: they are known from the reſt by having two flowers growing together; and from each other by the rudiment of a third flower between the two others, in the *Melica*, of which there is no ſign in the *Aira*.

Of the third diviſion you will find abundance of Graſſes ſufficiently common: *Briza* or ladies-hair, *Poa* or meadow-graſs, *Feſtuca* or feſcue, *Brome*-graſs, Oats with all the Oat-graſſes, and the Reeds. The genera are thus diſtinguiſhed:

Corol cordate: valves turgid. - *Briza.*
Corol ovate: valves rather ſharp. - *Poa.*
Corol oblong: valves pointed. - *Feſtuca.*
———— : valves bearded below the point. - - - *Bromus.*
———— : beard wreathed or bent. - - - *Avena.*
Corol woolly at the baſe: awnleſs. *Arundo.*

The *Brizas,* of which there are five ſorts, are very pretty graſſes; inſomuch that one of them is cultivated in gardens for its beauty and ſingular appearance. They flower early, in the month of May, grow in a looſe panicle, the foot-ſtalks of which are ſo ſlender as to be moved by every wind; whence they have obtained the name of *Quaking-graſſes.* By theſe circumſtances, and their general air different from their other neighbours, you cannot fail of knowing them. The three ſorts which you are likely to meet with are thus diſtinguiſhed:

1. Spiculæ (*r*) triangular: calyx longer than the flower. *Little Briza.*
2. Spiculæ ovate: calyx ſhorter than the flower. *Middle Briza.*
3. Spiculæ cordate: 17 flowers. *Great Briza.*

The ſecond is the ſort which is common in meadows, and the third is that which is cultivated in gardens: in this the flowers grow in a *raceme* rather than a panicle.

The *Meadow-graſſes* are numerous, there being no leſs than 24 ſorts regiſtred by Linnæus, and ſeveral of the ſorts are thrown abundantly from the lap of nature; for perhaps they are the beſt of all the graſſes for

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(*r*) Theſe are the little aſſemblages of flowers, or ultimate ſubdiviſions of the panicle or whole.

paſtures, the quantity of their produce being very great, their quality excellent both for green and dry food, and their verdure moſt freſh and pleaſant. But we are not huſbandmen, dear Couſin, Botany is our purſuit.

There are four ſorts of *Poa* very common in moſt meadows: which I ſhall diſtinguiſh by the names of 1. Great. 2. Trivial. 3. Narrow-leaved, and 4. Annual. They all flower in a looſe branching panicle. The ſtalks of the firſt ſort are generally erect, and throw out runners: the leaves are rather blunt at the end, and where they ſheath the ſtalk are ſmooth: the ſpiculæ are ovate, and on ſhort foot-ſtalks; the flowers growing cloſe together, from 2 to 6 in number, having their baſe, and the lower part of the keel woolly. The ſecond ſort is diſtinguiſhed by the leaves being ſharper pointed, and rough where they ſheath the ſtalk: the ſpiculæ conſiſt of two or three flowers, very ſeldom four. The third has the ſtems more erect: the leaves ſharp-pointed and roughiſh, but ſmooth where they ſheath the ſtalk: the panicle is more erect than the others; the ſpiculæ on longer footſtalks, with from 1 to 6 flowers, which are hairy at the baſe. Theſe are all perennial. The fourth is annual, and ſmaller than the others; extremely univerſal, and in flower the greateſt part of the year; it has a very looſe ſpreading panicle growing all on one ſide (*s*), the lower branches of it often coming out in pairs: the ſpiculæ producing 3 or 4 flowers: the ſtalk is oblique and compreſſed.

I muſt give you one caution in examining theſe, and the reſt of the panicled graſſes, which is this—that you ſhould take them at the time when they are arrived at full maturity, that is, when the panicle is completely expanded, and the flowers ſhow their ſtamens: for at different periods of their exiſtence, theſe graſſes put on ſuch various appearances, that they have deceived many eminent Botaniſts into forming ſeveral ſpecies out of one. To have the hiſtory of a plant complete, we ought to examine it every day during the whole time of its growth. What a work would ſuch a hiſtory of ten thouſand plants form! But the book of nature is inexhauſtible.

The genus *Feſtuca* or *Feſcue-graſs*, though leſs numerous than the laſt, yet contains 16 ſpecies. *Sheep's-feſcue* is a well known graſs, always to be found in dry paſtures, and ſheep commons. It has a cloſe, contracted panicle, growing on one ſide; the ſpiculæ have from 3 to 6 flowers; the valves of the flowers are very ſharp-pointed, but ſeldom properly awned; the culm is rather ſquare than round,

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(*s*) This is what Linnæus calls *Panicula ſecunda.*

almoſt naked, and the leaves are ſetaceous (*t*).

Another Feſcue (*u*), extremely different from the former, grows in watery places, ponds and ditches. It has a looſe panicle, of a conſiderable length, but little branching, growing on one ſide; the branches of the panicle are ſometimes ſingle, and ſometimes double; the ſpiculæ are round, linear, and awnleſs, almoſt an inch long, and preſſed cloſe to the ſtalk; varying in the number of flowers from 9 to 12. The leaves are not round like thoſe of the laſt, but flat; and the culm is very long, procumbent, branching and flatted. The ſeeds of this being large and ſweetiſh, are gathered for the table in Poland and ſome other countries, and appear there under the name of *Manna.*

In this graſs we have another inſtance of the changes wrought by ſoil and ſituation. Three ſpecies having been made out of one, until experiment detected the truth, and informed us that the ſeeds of the *flote* Feſcue ſown in a dry ſoil, become the firſt year *ſpiked*, and the ſecond *meadow* Feſcue-graſs. Nay *tall* Feſcue, a fourth ſpecies, has ſo many marks in common with the laſt, that it is matter of doubt, whether this alſo may not be a variety only (*v*).

(*t*) Very narrow, like thoſe of ruſhes.

(*u*) *Feſtuca fluitans*; flote Feſcue.

(*v*) See Hudſon Flora Anglica, edit. 2. p. 47.

The *Bromes* are very nearly allied to the *Feſcues*. They are diſtinguiſhed however by being all bearded, and the beard or awn ſpringing from the back, or below the tip of the chaff: whereas the *Feſcues* are often beardleſs, and when the flowers have a beard, it is an elongation of the chaff itſelf.

No graſs is more common in many paſtures than *Field Brome-graſs*. It has a looſe unbranched panicle: the ſpiculæ are ovate, the flowers are obtuſe, and the beards are ſtraight. It is an annual plant; and varies ſo much as to have obtained the name of *polymorphus* or *many-formed*. The two principal varieties (*w*) are, 1. that which has a ſoft down all over the panicles, leaves and ſtalks; with larger, heavier ſpiculæ. 2. that which is ſmooth all over; with the ſpiculæ thinner, and not hanging down ſo much, but often rather erect. Between theſe are two other varieties, 1. with the leaves downy, and the panicle almoſt ſmooth: 2. with the lower leaves only a little downy, and the panicle quite ſmooth. Other connecting links may eaſily be remarked by thoſe who are induſtrious in hunting after varieties.

There are three very large ſpecies of this genus, to be met with in woods and hedges, but

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(*w*) Bromus mollis & ſecalinus Linnæi. Mr. Hudſon, after Scopoli, has very judiciouſly made them one, under the title *polymorphus*.

but ſeldom in paſtures (x). They have great, branching, nodding panicles. *Barren Brome* is not very tall; but the *Giant* and *Wood Bromes* are three feet in height. Their ſize, added to the character and air of the genus, mark them out ſo well, that you will not eaſily miſtake, when you ſee them.

You will get an idea of the *Oat-graſſes* from the corn of that name, which having the parts of fructification larger than in the graſſes, gives you an advantage in the examination. *Bearded Oat-graſs*, vulgarly called *Wild Oats*, is alſo well known as a dreadful weed among corn. *Yellow Oat-graſs* is common in meadows and paſtures; is a neat pretty graſs; and will diſcover itſelf to you by the fineneſs and yellowneſs of its panicle.

The characters of the mentioned ſpecies are theſe:

1. Two flowers in one calyx: the ſeeds ſmooth, and one of them bearded. *Cultivated Oats.*
2. Three flowers in one calyx: hairy at the baſe; and all of them bearded. *Wild Oats.*
3. Panicle looſe: three flowers in a ſhort calyx; and all of them bearded. *Yellow Oat-graſs* (y).

(x) Bromus ſterilis, giganteus & nemoralis.

(y) Avena ſativa, fatua & flaveſcens *Linnæi.*

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The woollyneſs of the flowers in the *Reed,* will ſhow you this genus, as ſoon as it unfolds its panicle. It is a graſs, though vulgarly not regarded as ſuch, becauſe it is not uſed for the ſame purpoſes with the graſſes. That however makes no difference to us, whoſe province it is not to regard the uſes to which plants are put, but their ſtructure. If huſbandmen will not admit Reed to be a graſs, they take in other plants to their idea of graſs which we exclude, ſuch as Clover, Lucerne, St. Foin, &c. The reaſon is, that they conſider Graſs as an herb adapted to feed cattle: whereas naturaliſts define it to be an herb which has generally three ſtamens and two piſtils; always an unbranched, knotted, hollow ſtem, and ſimple linear leaves.

Though you are perfectly acquainted with the Reed (*z*), it is perhaps rather by ſeeing it nodding its large panicles in the water at a diſtance; or elſe by the uſe which your gardener makes of the long light ſtems for hedges to guard his tender plants; than by its fructification. You will not therefore be diſpleaſed to be told that it is diſtinguiſhed from the other ſpecies, which are ſix, by the looſeneſs of its panicle, and by having five flowers growing together in one calyx.

You are now arrived at the laſt diviſion

(z) Arundo phragmitis *Linnæi.*

of Corn and Graſſes, containing thoſe whoſe fructification is always in a ſpike properly ſo called. Of theſe,

Secale or *Rie*, has two flowers included in the ſame calyx.

Triticum or *Wheat*, has ſeveral flowers in one calyx.

Hordeum or *Barley*, has a ſix-leaved involucrum containing 3 flowers; and the flowers ſimple.

Lolium or *Darnel*, has a one-leafed involucrum, containing one flower only: but that flower compound.

Cynoſurus or *Dog's-tail Graſs*, has a one-leafed lateral involucrum, and a compound flower.

In *Rie* the exterior valve or chaff of the corol ends in a long beard or awn. The flowers are ſeſſile, and there is frequently a third between theſe, which is leſs and pedunculate. The filaments hang out of the flower. And our cultivated ſpecies * is known by the rough hairs upon the chaff.

In *Barley* alſo the exterior valve of the corol ends in a long awn. The flowers are ſeſſile. The filaments being ſhorter than the corol do not hang out, and therefore

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* Secale cereale *Linnæi.*

Barley is not ſo liable to be damaged by rain as Rie and Wheat.

There are four ſorts of Barley.

1. The *Common*, diſtinguiſhed by its two rows of erect beards; all the flowers being perfect and bearded.

2. The *Long-eared*, having the grains regularly ranged in a long double row, lying cloſe over each other; and flowers on the ſides, without piſtils or beards.—Theſe two ſpecies have the chaff very thin.

3. *Sprat Barley*, with ſhorter, broader ears, longer beards, the grains placed cloſer, and the ſtraw ſhorter and coarſer. This alſo has imperfect flowers on the ſides of the ear.

4. *Winter* or *Square Barley*, very diſtinct by having ſix rows of grains equally ranged, all furniſhed with ears, and perfect. The grain of this is large.

Beſides theſe ſpecies of corn, the genus contains ſeveral graſſes. *Wall Barley graſs* (*a*) is very common by way-ſides and under walls: and *Meadow Barley graſs* (*b*), which is very like it, only that it has a longer ſtalk and a ſhorter ſpike, is found in moiſt meadows. The common name of this laſt is

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1. Hordeum vulgare. 2. Hordeum Zeocriton. 3. Hordeum diſtichon. 4. Hordeum hexaſtichon; called alſo *Bear* and *Big*.

(*a*) Hordeum murinum *Linnæi*.

(*b*) Hordeum pratenſe.

Rie graſs; and indeed it reſembles Rie more than Barley. I have ſeen it cultivated alone; but the ſort which is generally ſown, and vulgarly called Rie Graſs, is in reality *Ray graſs*, which will be announced to you preſently. Theſe two ſorts, though apparently ſo alike, and thought to be but varieties by many, are however very diſtinguiſhable: the Wall Barley-graſs having the imperfect lateral flowers bearded, and the intermediate involucra ciliate; whereas the Meadow Barley-graſs has the ſame flowers beardleſs, and the involucra very narrow, like briſtles, and rough.

In *Wheat* the exterior valve of the corol is ſometimes bearded, but not always. There are generally three or four flowers in the ſame calyx, and the middle one is frequently imperfect. The filaments hang out, but not ſo much as in Rie.

1. *Common Wheat* has four flowers in one calyx, the chaffs are ſmooth, turgid, imbricate; ſometimes it has ſhort beards but more often none: hence and from the colour, &c. are ſeveral varieties which huſbandmen notice, and we have nothing to do with.

2. *Summer* or *Spring Wheat* has alſo four flowers together, and agrees with the former in the other characters, except that it is always bearded.

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1. Triticum hybernum. 2. Triticum æſtivum.

3. *Gray Wheat* has villous, turgid, imbricate, obtuſe chaffs, containing four flowers. The ears are large, heavy and nodding; the beards are very long, and drop off when the grain is full grown: the chaff being villous all over, gives the ear a gray appearance.

4. *Cone Wheat* has villous, turgid, imbricate chaffs; and the ear of a pyramidal form, ending in a ſlender point; the beards are long and rough.

5. *Polonian Wheat* has two flowers only in each calyx, which are naked, and have very long awns; with the teeth of the *rachis* or receptacle of the ſpike bearded. The ears are long and heavy.

6. *Spelt* has four flowers, but two only produce any grain; the outer ones are abortive, as the lower ones are in every ear: the outer chaff of the perfect flowers has a beard about an inch long. The flowers are more conical, and the grain is leſs than in wheat: the chaff alſo is adherent.

Few plants are more univerſal than one graſs of this genus: it is known by the name of *Dog's-graſs*, and generally execrated by huſbandmen under the name of *Couch* or

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3. Triticum turgidum: called alſo *Gray Pollard*, *Duck-bill* and *Fuller's Wheat*.

4. Not noticed by Linnæus.

5. Triticum Polonicum.

6. Triticum Spelta. I do not know that this ſort is ever cultivated in England.

Quich, which is but a corruption of *Quick*, the ancient term for *living*. It well deſerves this appellation, for it runs prodigiouſly at the root, and like Hercules's hydra, the more you hack and cut it, the faſter it propagates itſelf. It is diſtinguiſhed from the ſeveral ſpecies of corn by the ſmallneſs of the ear and the grain, and alſo in being perennial; whereas all ſorts of corn are annual: from the other graſſes of the ſame genus, by having many flowers, about five generally to one calyx, and thoſe not bearded, but very ſharp-pointed at the end (*c*). There is another ſpecies, which has about four flowers in a calyx, and is bearded (*d*). This grows in woods and hedges.

Before I quit this genus, I muſt obſerve, as a ſingularity, that it is not known, with any degree of certainty, to what country we are originally indebted for the ſeveral ſpecies of corn, or whether they now grow wild in any. One ſays that Wheat came firſt from Africa; others, with more probability, that it travelled into Europe from the Eaſt. Linnæus affirms that Rie grows naturally in Crete; and Spring Wheat, with Sprat Barley (*Hordeum diſtichon*) in Tartary; but upon what authority I know not. A

(*c*) Triticum repens *Linnæi*. The number of flowers varies from 3 to 8. *Hudſon*.

(*d*) Triticum caninum *Linnæi*.

late traveller alſo found Barley and Oats in Sicily growing like weeds among the buſhes, but he does not pretend to determine, whether they grew there originally wild, or whether they were ſtray deſerters from the fields where they had been cultivated (*e*).

Lolium or *Darnel-graſs* is an exception from the general character; for it has only one chaff or leaf to the calyx. The reaſon of this is, that the ſpiculæ are ſeſſile, and in the ſame plane with the culm, which by this poſition is enabled to perform the office of the deficient leaf of the calyx in protecting the ſeed. This ſingle chaff contains ſeveral flowers. Of the two common ſpecies in this genus one is *perennial* (*f*), the other *annual* (*g*). The firſt is found naturally in meadows, paſtures, and by way-ſides. The diſtinctive marks of the ſpecies are, that the ſpiculæ in the firſt are longer than the calyx, and the flowers beardleſs: whereas in the

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(*e*) Voyage en Sicile, &c. addreſſed to Abbé Winckelmann, French tranſlation, p. 78, printed at Lauſanne, 1773. Diodorus Siculus alſo ſays that Wheat is wild in Sicily. V. 2.

(*f*) Lolium perenne *Linnæi*. This is the ſort which has been long cultivated in England under the name of *Rie-graſs*, which is a corruption of *Ray-graſs*; and that is derived from the French *Yvray*, a name given to the ſecond ſort, from its quality of affecting the nerves, ſomething like drunkenneſs: which makes it to be reputed a dangerous weed among Wheat.

(*g*) Lolium temulentum *Linnæi*.

the ſecond, which is a weed among the corn, the ſpiculæ are only of equal length with the calyx, and the flowers have ſhort beards. Sometimes however it happens that the flowers of the perennial ſort have little beards, and thoſe of the annual none: but you may always know them, not only from their duration and place of growth, but becauſe the ſecond is larger in every reſpect; the ſtalk higher, the ſpike longer; the ſpiculæ alſo are much more remote, ſo that they do not touch each other, as they do in the firſt.

Cynoſurus or *Dogs-tail graſs*, was the laſt mentioned of this diviſion. The character of the genus is taken from a lateral leaf to each calyx, which Linnæus calls the receptacle, involucrum or bracte (*h*): this gives the ſpike an air by which the genus is eaſily known from all others. There is an elegant ſpecies (*i*) very general in parks and on commons, and found alſo in other paſtures, which has theſe bractes pinnatifid, or toothed like a comb: the corol does not open, but cloſely inveſts the ſeed, which therefore does not fall: the ſpiculæ have from 3 to 5 flowers, are all turned the ſame way, and do not ſit cloſe to the receptacle or common ſtalk of

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(*h*) For an explanation of theſe and other terms I muſt refer you once more to the elementary books.

(*i*) Cynoſurus criſtatus *Lin.* Creſted Dog's-tail.

the ſpike; one peduncle ſupports ſometimes two or three of theſe ſpiculæ. The ſtalk is very erect and ſlim, and the leaves are narrow and ſmooth.

There remain ſtill ſome graſſes which militate againſt the artificial ſyſtem, and are therefore not to be found in the third claſs of Linnæus's. But as we are not bound to follow him ſervilely, we will rather follow nature, who is a better guide.

Earlier than any of the reſt flowers a graſs, called from thence *Vernal Graſs*. Linnæus has named it *Anthoxanthum*, from the yellowneſs of its ſpike. This will ſerve at preſent to introduce it to your acquaintance, until you have an opportunity next ſpring to examine the flowers more minutely. It has obtained the epithet of *odoratum* from the ſweet odour which it communicates to hay. This genus ſtands alone in the ſecond order of the ſecond claſs. Each calyx ſuſtains but one flower; each valve of the corol has an awn, one bent, and proceeding from the baſe, the other almoſt from the top: the two filaments are very long; and the two ſtyles are filiform: the chaff of the corol adheres to the ſeed. There are three ſpecies of the genus. Ours is diſtinguiſhed by the ſpike being of an oblong form; and the flowers growing on ſhort peduncles, and being longer than the beards.

There is alſo one ſpecies of graſs, called *Cinna*, in the ſecond Order of the firſt Claſs.

But in the firſt Order of the twenty-third Claſs (*k*) are ſeveral genera; of which the *Holcus* or *Soft-graſs* is moſt likely to come under your obſervation. This, and all the others have ſmaller imperfect flowers among the perfect ones; a circumſtance which conſtitutes them of that claſs. They have all bivalvular chaffs for calyx and corol: three ſtamens, two piſtils, and one ſeed: together with the whole port or air of the plants we have been juſt conſidering: circumſtances which plainly denominate them Graſſes. *Holcus* differs from its neighbours, in having two flowers incloſed in one calyx, which is beardleſs; whereas the outer valve of the corol generally has a beard. The imperfect flowers have neither corol, piſtil nor ſeed; but only three ſtamens within the bivalvular chaff of the calyx. The two common wild ſpecies are thus diſtinguiſhed: *Meadow Soft-graſs* (*l*) has villous chaffs: the perfect flowers are beardleſs; the imperfect have a bent awn. *Creeping Soft-graſs* (*m*) has ſmoothiſh chaffs: the perfect flowers are beardleſs, but the imperfect have a jointed awn. They are very much alike, but the

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(*k*) Polygamia Monoecia.
(*l*) Holcus lanatus *Lin.*
(*m*) Holcus mollis *Lin.*

calyx is more acute in this than in the former, or indeed than in any of the ſpecies. The firſt grows in paſtures; the ſecond in corn-fields and hedges.

Since it is not uncommon to find incomplete or imperfect flowers among thoſe which are perfect, in many of the graſſes, which are ranged by Linnæus in his third claſs; you will perhaps aſk me why he has not either put them alſo in the twenty-third, or elſe ranged them all together in the third. To this queſtion I cannot return you a better anſwer, than that the imperfect flowers ſeem not ſo conſtant and regular in the one as in the other; or perhaps are to be met with only in one ſpecies of the genus.

We have now run through the graſſes: there are many other plants very nearly allied to them; as *Schoenus* or *Bog-ruſh*, *Cyperus*, *Scirpus Club-ruſh* or *Bulruſh*, all three very numerous genera, *Eriophorum* or *Cotton-graſs*, &c. in the firſt Order of the third Claſs. *Cat's-tail*, *Bur-reed*, and all the *Carices* or *Sedges*, in the third Order of the twenty-firſt. Theſe have the manner of growth, the leaves, the appearance of Graſs; they have alſo three ſtamens: but the ſtalk is filled with a ſpongy ſubſtance, and the flower is deſtitute of petals. Finally the *Ruſhes* and ſome few others, in the firſt Order of the ſixth Claſs, have a ſix-leaved calyx,

lyx, a hexapetalous corol or none, ſix ſtamens, and the ſeeds in a triangular capſule.

I have not told you all this while that *Sugar* is a graſs, of the firſt diviſion, which perhaps you did not expect. But if you are not tired, dear Couſin, I am; ſo adieu for the preſent.

LETTER XIV.

July the 1ſt, 1774.

YOU are not to ſuppoſe, dear Couſin, that becauſe the laſt letter was engroſſed wholly by Graſſes, the third Claſs therefore of the Syſtem contains no other plants. In truth there are no fewer than 76 genera, and 618 ſpecies, in the three Orders of this Claſs taken together. You ſee however that though the Graſſes do not occupy the whole, they make a very large proportion of it.

There are ſome very beautiful genera in the firſt order of this claſs, particularly the *Ixia* and *Iris*, or *Fleur-de-lys* (*a*). Theſe with *Crocus*, *Gladiolus*, *Antholyza*, and a few others not eaſily met with, agree in having a *Spathe* or ſheath inſtead of a calyx; a corol of ſix petals, or at leaſt cut into ſix parts; generally three ſtigmas, or one that is trifid; and a triangular, trivalvular, trilocular capſule to incloſe the ſeeds: they have alſo long, narrow leaves, ſomething reſembling thoſe of Graſs—Linnæus calls them

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(*a*) Corrupted into *Flower-de-luce.*

Enſiform or *ſword-ſhaped* (*b*). Theſe plants are very nearly allied to the Liliaceous tribe (*c*), and are indeed enrolled in it by the generality of authors who have aimed at framing a natural arrangement.

Take any ſpecies of *Iris*, either the *blue* (*d*) or *white* (*e*) ſorts, which you have ſo abundantly in the borders of your ſhrubberies, and plantations; or elſe the *yellow* (*f*) one, common in wet places, and uſually called *flag*. In the firſt place you will obſerve, that whether the flowers are open or cloſed, each has its own ſheath, ſeparating it from the others. The corol at firſt ſeems to conſiſt of ſix petals, but you will quickly ſee that the parts are all united at the baſe: the three outermoſt of theſe parts or petals are bent downwards, and thence are called *falls*; the three inner ones ſtand erect, and have the name of *ſtandards*. In the centre of them are three other petals, as they ſeem to be; but in reality they are the ſtigma, thus divided into three parts; and under each diviſion you will detect a ſingle ſtamen lurking, with the filament bent along with the ſtigma, and terminated by a large oblong,

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(*b*) Hence in his *Natural Orders*, he has kept theſe together, with the addition of ſome others, under the title of *Enſatæ*.

(*c*) See Letter I.

(*d*) Iris Germanica *Linnæi*.

(*e*) Iris Florentina *Linnæi*.

(*f*) Iris pſeudacorus *Linnæi*.

flatted anther: for the germ you muſt ſearch below the flower, and there you will find it a green oblong body; which when the flower is faded and fallen becomes in moſt ſpecies a three-cornered capſule, opening by three valves, and having the ſeeds ranged in three cells. We have not yet noticed a ſet of ſmall bodies forming a villous line along the middle of the reflexed petals; but this you perceive is not common to all the ſpecies, your blue and white Iris having it, but not your yellow flag; it cannot therefore be a mark of the genus. However it may ſerve the purpoſe of ſubdividing it, or furniſhing a ſpecific character. When you have finiſhed with the fructification, you will remark that the leaves are very narrow in proportion to their length, and that they are not unaptly termed enſiform from the ſimilitude of their ſhape to that of a broadſword. If you can have the heart to pull one of theſe fine plants out of the ground, you will ſee that the roots are not fibrous, but oblong and fleſhy: I gueſs however that you will take my word 'till the autumn, when the gardener will be removing ſome of them, or at leaſt expoſing their roots, when he digs his borders.

You may diſtinguiſh the *blue* or *German*, the *white* or *Florentine*, and the *yellow* or *marſh Iris*, ſpecifically thus. The two firſt have the corols bearded; the firſt and third have ſeveral flowers upon the ſtem; the ſecond has only one or two flowers, and the peduncles are not ſo long as in the firſt; the third has the corols beardleſs, and the interior petals leſs than the diviſions of the ſtigma (*g*). But why all this parade ſay you, when we know them by their hues; blue, white and yellow? Truſt not too much to colour, fair Couſin. What if an Iris were to preſent itſelf with blue flowers, and only one or two on the ſtem, or without beards, or with the flowering ſtem ſhorter than the leaves, would ſuch be of the ſame ſpecies, merely becauſe the corol is of a blue colour? No ſurely: and we pay more reſpect to theſe circumſtances than to colour, not becauſe we eſteem them more, but becauſe they are more certain and permanent.

The *Chalcedonian* Iris (*h*) has ſtems two feet and an half high, ſupporting one very large flower; the three ſtandards are very broad and thin, with black and white ſtripes; the three falls are of a darker colour: this is one of the bearded ſorts.

Among theſe handſome ſpecious plants, let us not forget the humble *Perſian* Iris (*i*), ſeldom riſing three inches from the ground, but beautiful in its colours, fragrant in its

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(*g*) They are all three diſtinguiſhed from ſome other ſpecies by the flowering ſtalk ſtanding up ſuperior to the tips of the leaves.

(*h*) Iris ſuſiana *Linnæi*. (*i*) Iris Perſica *Linn.*

ſcent,

ſcent, and flowering at a time when few beauties dare truſt themſelves to dubious ſkies and inclement air (*k*). One or two flowers come out together: the ſtandards are of a pale ſky blue; the falls are of the ſame colour on the outſide, but the lip has a yellow ſtreak running through the middle, and on each ſide are many dark ſpots with one large deep purple ſpot at the bottom: they have no beard. The leaves are hollowed like the keel of a boat, and are about ſix inches long. You will be glad to entertain this pretty dwarf, when there is little elſe to amuſe you in this way beſides Crocuſes and Snowdrops.

I have ſent you this little noſegay of handſome flowers, to make you amends for all the dry chaff and hay with which I fatigued you in my laſt.

(*k*) February.

LETTER XV.

July the 8th, 1774.

CONSCIOUS, dear Couſin, that the noſegay of my laſt was too ſmall to employ you long, I have haſted to ſend you the fourth Claſs, which is rather more numerous than the third in the genera, of which it contains 74; but far leſs ſo in the ſpecies, there being no more of theſe than 273.

You will have ſome examples in this claſs, of *aggregate* flowers, the general nature of which I explained to you before (*l*); but you will be perfect miſtreſs of it, I am perſuaded, when you have conſidered the ſtructure of the *Teaſel* and *Scabious*. Theſe and all others of this natural order have monopetalous corols, ſucceeded by one ſeed, to which they are ſuperior. A number of theſe are included within one common calyx, as in the compound flowers, from which they differ, in having the ſtamens four in number, and totally diſtinct, with a calyx proper to each little flower; they might however eaſily be confounded with compound flowers if the general form and appearance only were attended to.

(*l*) In Letter VI.

The two genera of *Teaſel* and *Scabious* agree in having the common calyx polyphyllous, or conſiſting of many leaves. The firſt has chaffs between the flowers on the receptacle, or common baſe of them all; the form of which is conical. The ſecond has theſe chaffs in ſome ſpecies, but in others the receptacle is naked; the form of it is convex: it is remarkable for a double calyx to each little flower, beſides that which is common to the whole. The leaves of the calyx are very long in the Teaſel, and in ſeveral rows in the Scabious.

Such are their principal generic diſtinctions. Common Teaſel (*m*) is ſeparated from its congeners (*n*), by its ſeſſile leaves, which are ſerrate or toothed about the edges. The conical head of the Teaſel is furniſhed with ſtiff beards, which in the wild ſort are ſtraight, but in the cultivated hooked. This difference does not ſeem to moſt modern naturaliſts conſiderable enough to make them ſpecifically diſtinct; though in culture they never loſe their bent, and conſequently their utility in raiſing the nap of woollen cloth: but qualities of the greateſt importance to the Artiſt, are ſometimes but lightly eſteemed by the Botaniſt, who wiſhes to view things as they came out of the Creator's hand; not

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(*m*) Dipſacus fullonum *Lin.*

(*n*) There are only three ſpecies.

as they have been changed and improved by men, for their amuſement or ſervice.

Of Scabious there are no leſs than 30 ſpecies. The genus divides conveniently into ſuch as have the corols of the little flowers divided into four, and ſuch as have them divided into five ſegments: of the firſt there are 11, of the ſecond 19 ſpecies. Of our three wild ſorts two are in the firſt diviſion, and one in the laſt. The common field Scabious * is a large, tall plant; the ſtalk is hairy; the lower leaves are ſometimes almoſt entire, ſometimes they, as well as the leaves upon the ſtem, are pinnatifid. The outer flowers are larger and have the corol deeper cut than the middle ones, and the outer ſegments are alſo largeſt: they are of a pale purple colour.

The other ſpecies with quadrifid corols is called *Devil's-bit* (*o*), becauſe it has a ſhort tap root, which appears as if the end were bitten off. The ſtalks of this are not ſo high, nor are they branching as in the firſt: they generally ſend out two ſhort peduncles from the upper joint, oppoſite to one another, each terminated by one ſmall blue flower, as is the principal ſtalk by one larger; the little component flowers are not irregular as in the former. The leaves are ſimple and entire, oblong and drawing to a point at each end. This ſpecies grows in paſtures and woods, and flowers later than the firſt, which is common in corn fields, and not uncommon in paſtures.

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* Scabioſa arvenſis *Lin.* (*o*) Scabioſa ſucciſa *Lin.*

Small Scabious (*p*), beſides having quinquefid corols, is diſtinguiſhed from the two others, by having the leaves next the ground ovate and notched about the edges, whilſt thoſe upon the ſtem are pinnate; towards the bottom the pinnæ are broader, but in the upper ones very narrow; there are about eight pair of theſe, and the terminating lobe is large. The aggregate flower is produced ſingle on a long peduncle, the outer little flowers larger, and very irregular, as in the firſt ſpecies, of a pale blue colour. It is common in paſtures, eſpecially where the ſoil is chalky.

Before you are got thus far, I am perſuaded your own mind has ſuggeſted to you that a plant with dark purple flowers, and a ſtrong ſweet odour, which your gardener ſows every year in the borders, is of this genus. The name of *Sweet Scabious* has not led you, who are not governed by mere names, to ſuppoſe this, but the evident ſimilitude in the ſtructure. An accurate examination of the flower will confirm your ſuſpicion; and you will find it to be one of thoſe

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(*p*) Scabioſa columbaria *Lin.*

which have quinquefid irregular corols; the receptacle of theſe is oblong; the common calyx conſiſts of 12 linear folioles, of the length of the aggregate flower, and bent back: the leaves are finely cut (*q*). The colour of the corol varies from black to pale purple, red and variegated, and ſometimes the main flower is ſurrounded by a ſet of very ſmall ones on ſlender peduncles, as in the *Hen and Chicken Daiſy*; but all theſe are confeſſedly no other than ſeminal varieties. Though now ſo common with us, this plant is originally from the Indies.

This Claſs compriſes another natural order of plants entitled *Stellated*, from the manner in which the leaves grow upon the ſtem, ſeveral together in ſets one above another, radiating like the points of a ſtar, as it is commonly repreſented. I muſt obſerve to you, that though in this caſe, and in many others, a claſs or order takes its name from an obvious or ſtriking circumſtance in its ſtructure, yet it does not follow that all plants which have that ſtructure are to be looked for there, or that this is the only or even principal reaſon of their being kept together. When a plant of this or that general appearance preſents itſelf, you may reaſonably preſume that it ranks in this or that order; but outward appearances muſt

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(*q*) Scabioſa atropurpurea *Lin.*

not carry you beyond preſumption, and it is the ſtructure of the fructification that muſt determine you at laſt (*r*).

In the *Stellated* plants the ſtructure is this: the calyx is extremely minute, divided into four parts, and perſiſtent; the corol is monopetalous divided into four ſegments; the ſtamens are four in number; the germ is double, and below the flower; the ſtyle is bifid; the fruit is globoſe, and contains two ſeeds. The ſtalk is quadrangular.

All the genera of this order reſemble each other ſo much, that ſome authors have reduced them into one. *Madder* has a bell-ſhaped corol, ſucceeded by two berries with one ſeed in each. *Sherardia* and *Woodroof* have funnel-ſhaped corols: the firſt has a little crown to the ſeeds, the ſecond has them globoſe, without any crown. *Galium* has a ſalver-ſhaped corol, and two roundiſh ſeeds. This laſt genus has 24 ſpecies, 18 of which have the fruit ſmooth; in the remaining 6 it is rough. The number of leaves in each ſtar or whorl, together with the ſhape of them, gives the principal ſpecific diſtinctions.

(*r*) See what was ſaid upon this ſubject with reſpect to the Elder in Letter V. I muſt add that uſe and practice is neceſſary to give the proper tact in natural objects as well as works of art: the ſimilitudes and analogies that ignorant perſons find being uſually truly ridiculous.

White Galium, or *White Ladies Bedſtraw* (*s*), has four leaves in a whorl towards the bottom of the ſtem, and ſix narrower ones higher up. *Great Ladies Bedſtraw* (*t*), has eight, a little notched about the edges, ovate in form, and terminating in a point or little hook. *Yellow Ladies Bedſtraw* (*u*) has alſo eight leaves, but they are very narrow, and furrowed; the flowering ſtalks are very ſhort, and the corols are yellow. The firſt grows in moiſt meadows, and by river ſides; the ſecond in hedges, and on heaths among the buſhes; the third is very common in paſtures, on walks, and by way ſides. Theſe three all have ſmooth ſeeds. The common *Galium* (*v*), known by the name of *Gooſe-graſs* or *Cleavers*, every body knows to have rough ſeeds, by their ſticking to the clothes as we paſs near the hedges. The leaves alſo are rough, lance-ſhaped, and eight in number. The flowers of all the ſpecies and indeed of the whole tribe are very ſmall, but the plants are known at firſt ſight by their air.

The *Plantains*, are alſo of the firſt Order of this Claſs *Tetrandria*: they are numerous, for there are twenty ſpecies of them. As there is a great number of ſmall flowers growing together in a ſpike or oblong head,

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(*s*) Galium paluſtre *Lin.* (*t*) Galium Mollugo *Lin.*
(*u*) Galium verum *Lin.* (*v*) Galium Aparine.

you muſt ſeparate one of them to examine the parts of the fructification diſtinctly. You will then find that each of theſe ſmall flowers has a quadrifid calyx and corol, with the border of the latter reflexed: the filaments are remarkably long; and the ſeed-veſſel is a bilocular capſule, opening horizontally, and placed above the receptacle.

The *Great* (*w*) and *Ribwort* (*x*) Plantains are doubtleſs well known to you; the firſt ſo common by way ſides, and the ſecond in paſture grounds. The *Great Plantain* is diſtinguiſhed by its ovate, ſmooth leaves, and its round, naked flowering-ſtalk (*y*) terminated by a long ſpike of flowers laying cloſe over each other (*z*). *Hoary Plantain* (*a*) is nearly allied to this, but the leaves are longer, and white with hairs; the ſpike is cylindric, but ſhorter and thicker than in the firſt. *Ribwort Plantain* has the leaves lance-ſhaped, a ſhort naked, ovate ſpike, the ſcape angulate, and twiſted. This and the other ſpecies have the leaves marked lengthwiſe, with very prominent ribs or nerves.

By ſubmitting to examine theſe plants, which you was already acquainted with, you will

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(*w*) Plantago major *Lin.*

(*x*) Plantago lanceolata *Lin.*

(*y*) This Linnæus calls *ſcapus*, from its reſemblance to the ſhaft of a column.

(*z*) Imbricate. (*a*) Plantago media *Lin.*

will acquire a facility in diſcovering ſuch as are ſtrangers to you; for you have too much ſenſe to deſpiſe them becauſe they are common, or deſtitute of beauty: in confidence of this, I have been ſtudious to ſelect rather ſuch plants as you may readily meet with, and are proper for examination, than thoſe that are moſt rare and valuable. If you were in the neighbourhood of a famous Botanic Garden, I might be nicer in my choice, and at the ſame time preſent you with greater variety, but perhaps after all I might not be more uſeful, or you more amuſed: at leaſt I ſhall hope for the continuance of that indulgence a little longer with which you have hitherto honoured me (*b*).

But to return to our buſineſs; there is a plant of this fourth claſs and firſt order, which I muſt not omit preſenting to you, were it but for the name's ſake. *Ladies-Mantle* has a calyx of one perſiſtent leaf, divided into eight ſegments, four of which are larger, and four ſmaller; it has no corol; and only one little ſeed to each flower. There are three ſpecies of *Ladies Mantle*. 1. The Common. 2. The Alpine, and 3. The

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(*b*) Students in Botany who live in or near London, or come occaſionally to the great city, will be happy to profit by Mr. Curtis's excellent garden, at Lambeth, where ſo great a number of plants is arranged and named, ſo that he that runs may read.

1. Alchemilla vulgaris. 2. Alchemilla alpina.
3. A. pentaphyllea *Linnæi.*

Five-leaved. The firſt is known by its ſimple, lobate leaves, nicely ſerrated about the edge, and divided into from 8 to 12 greater parts: before the leaf expands it is folded or plaited at each of theſe diviſions; and hence the name. The flowers grow in bunches, are inconſiderable in point of ſize, and alſo of colour, for having no corol, they are only green, or what Botaniſts call herbaceous. It is an humble, but an elegant plant, and grows in high paſtures, but not common.

Alpine Ladies Mantle is much more elegant than this, with its ſhining, ſilky leaves, which are digitate, and indented at the end: the folioles or component leaves vary in number from five to nine. The third ſpecies is very uncommon: it is a ſmall plant, quite ſmooth, with digitate leaves, but each of its five folioles divided half way into ſeveral ſmaller ones.

The ſecond order of this claſs has a ſingular plant, *Cuſcuta* or *Dodder*. It is without leaves, has a ſtalk ſlender as a thread, which would trail along the ground did it not lay hold on ſome plant ſtronger than itſelf for ſupport; not content with ſupport, where it lays hold, there it draws its nouriſhment; and at length in gratitude for all this, ſtrangles its entertainer. I imagine this account will not beſpeak your affection for

Dodder (*c*). If you will be at the pains of diſembarraſſing a poor ſuffering bean of its entangling ſtalks, you will ſee that the flowers come out in ſeſſile knots; that each of theſe has a calyx divided half way into four parts; that the corol is of one petal divided into four ſegments at the edge: and that the ſeed-veſſel is a bilocular capſule. This paraſite, as Linnæus juſtly calls ſuch plants, faſtens itſelf about beans, nettles, clover, flax, &c. and feeds upon them by means of innumerable teats or glands which it inſerts into the pores of its ſupporter's bark.

The *Pondweeds*, which are many, and ſufficiently common, will ſerve for an inſtance of the third order. If your own fiſh-ponds are kept too clean to furniſh theſe plants, you may probably procure them from ſome of your neighbours; or if they were worth the carriage, I could ſend you abundance from our moat. You will know them by the leaves laying flat upon the water; and by the ſtem's puſhing up a ſpike of inconſiderable flowers, that have no calyx, a corol of four deciduous petals, four germs terminated by obtuſe ſtigmas, without the interpoſition of any ſtyle, and becoming in time four roundiſh ſeeds.

(*c*) Cuſcuta Europæa *Lin.* The diviſions of the calyx and corol and the ſtamens are ſometimes five: hence ſome place it in the next Claſs.

The *broad leaved* (*d*) ſpecies is one of the moſt common, and is known by its oblong-ovate leaves. *Perfoliate* Pondweed (*e*) has heart-ſhaped leaves embracing the ſtalk, and grows in running waters. *Curled* Pondweed (*f*) has lance-ſhaped, waving leaves, notched about the edges, and ſtanding alternate upon the ſtem: this is found both in running and ſtagnant waters.

But of theſe enough—don't hazard getting wet, or catching cold in ſearch of them. If any of theſe plants which I have hitherto recommended to your notice, elude your ſearch, or have paſſed their ſtated time of flowering before you find them, note them down for next year: ſo adieu, dear Couſin.

(*d*) Potamogeton natans. (*e*) Perfoliatum.
(*f*) Criſpum *Linnæi.*

LETTER XVI.

March the 25th, 1775.

MY indiſpoſition of laſt autumn, has given you ample leiſure, dear Couſin, to make yourſelf miſtreſs of the general arrangement of Plants, and of the firſt four Claſſes in particular. Since it is your earneſt deſire, I have reſumed my former prate as early as poſſible, that nothing may eſcape us this ſeaſon. We have now a large claſs to encounter with, containing more than a tenth part of the vegetable world, for it has 261 genera, and 1500 ſpecies. It includes, as you may ſuppoſe, ſeveral natural orders, and ſome ſpecies are even now ready for examination.

We will open the year, by your leave, with the *Primroſe*, which has its name from being one of the firſt flowers that blow. This, with ſome others that reſemble it, form a natural order, entitled for the ſame reaſon, *Precia* (*g*); and agreeing in having a monophyllous, quinquefid, perſiſtent calyx; a monopetalous; quinquefid corol; and a capſule for a ſeed-veſſel ſuperior, or incloſed within the calyx. The characters of the

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(*g*) Præcoces, early.

genus are, an involucrum under the flower, or knot of flowers; the corol funnel-ſhaped or ſalver-ſhaped, with the tube cylindric and open at the top: the ſtigma globoſe; the capſule unilocular. The ſpecies (*h*) is diſtinguiſhed by its pentagonal calyx, its cylindric oblong capſule, and its leaves with a wrinkled ſurface and indented edges. The three principal varieties, if they are but varieties, are thus commodiouſly ſeparated. The *Primroſe* (*i*) has one flower on a naked ſtem, and the corol ſalver-ſhaped. The *Oxſlip* (*k*) has ſeveral flowers on one naked ſtem, and the corol ſalver-ſhaped. The *Cowſlip* (*l*) has many flowers on a naked ſtem, and the corol funnel-ſhaped. The yellow of the two firſt is very pale; the corol of the Primroſe is much the largeſt; that of the Oxſlip a middle ſize between the two others: the ſimple unbranched flowering ſtem of the Primroſe is weak, and rather a peduncle than a ſtalk; the ſcape of the Oxſlip is ſometimes near a foot high and ſtrong; that of the Cowſlip, is generally lower and weaker. I do not know whether I dare to tell you that all the beautiful varieties of *Polyanthus*, that you prize ſo much, are but an accidental variety of this ſpecies, which

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(*h*) Comprehending Primroſe, Oxſlip, Cowſlip, and Polyanthus.

(*i*) Primula acaulis *Lin.* vulgaris *Hudſon.*

(*k*) Primula vulgaris *β. Hudſ.*

(*l*) Primula veris *Lin.* & *Hudſ.*

which is certainly much diſpoſed to vary even in its wild ſtate. Thus the Primroſe has ſometimes two flowers together, or changes to green, or to red, or doubles its corol; the Oxſlip ſometimes has very few flowers, and they nearly as large as a Primroſe; and the Cowſlip has frequently red flowers, then much reſembling a ſmall Polyanthus.

See now by how many ſteps you arrive at a knowledge of theſe plants. You firſt determine their claſs and order, by ſeeing that they have five ſtamens, and one piſtil; having ſtill 138 genera to encounter, you next ſettle what ſubdiviſion of the order they range under; and finding that the corol is monopetalous, inferior, and ſucceeded by a veſſel incloſing the ſeeds, you are reduced to 66 genera. Next you diſcover that they are of the natural order of *Preciæ,* which leaves you but 10 genera to chooſe out of. You are now got within ſo ſmall a compaſs that it cannot be very difficult to aſcertain the genus, the ſpecies which are only ſix in number, and the ſubordinate varieties. I do not make all this parade, in order to enable you to diſcover a plant which you was perfectly acquainted with beforehand, but to ſhow you how you are to proceed with a plant you do not know, from this inſtance of one which you do.

Or you may take it thus—You have a plant in flower, which for the preſent we will ſuppoſe you to be unacquainted with. You firſt examine the ſtamens and piſtils; and by the number of theſe you determine your plant to belong to the fifth claſs and the firſt order. You next conſult the ſubdiviſions of that order, and find it belonging to that which has monopetalous inferior corols, with the ſeeds incloſed in a veſſel. Seeing farther that your plant has a monophyllous calyx cut into five ſegments, that the corol is alſo divided in the ſame manner: this added to the foregoing circumſtances ſhows you that it ranges under the natural order of *Preciæ*. Here remarking an involucrum under the flowers, the tube of the corol cylindric and open at top, and the capſule unilocular or one-celled, you are aſſured at length that your plant is of the genus *Primula*. But finding that the leaves, inſtead of being wrinkled, are perfectly ſmooth, fleſhy and either entire, or ſharply notched about the edges, you are well aſſured that it is a diſtinct ſpecies, and upon enquiry diſcover it to be the *Auricula* (*m*), the elegant, the powdered Auricula, ſo much eſteemed by Floriſts, and ſo various in the ſize and colours of its corol, when in a ſtate of cultivation.

(*m*) Primula Auricula *Linnæi.*

All the other plants of this natural order are pretty, if not ſpecious. *Meadia*, perverſely altered by Linnæus to *Dodecatheon*, is an American plant, but flowers well and early in our climate. It has a rotate or wheel-ſhaped corol, reflexed: the ſtamens ſit upon the tube; and the capſule has one cell only, and is oblong. This is ſufficient for the complete detection of the plant, ſince there is only one known ſpecies. The leaves however are ſmooth; the flowering ſtems are naked, eight or nine inches high, and ſuſtain many flowers, each of which has a long ſlender peduncle, which is recurved ſo that the flower hangs down; the corol is of a beautiful light purple. If you have not this plant already in your garden, procure it againſt next ſpring; you will be pleaſed with the ſtructure and appearance of it.

Cyclamen reſembles Meadia in its wheel-ſhaped, reflexed corol, but the tube is globular, and remarkably ſhort, with the neck prominent; the ſtigma, which was obtuſe in that, is acute in this. The ſeed-veſſel is roundiſh and fleſhy, incloſing ſeveral angular ſeeds: Linnæus calls it a berry covered with a capſular ſhell. There are ſeveral ſpecies or varieties of Cyclamen; for it is doubtful whether they are poſitively diſtinct or not. The moſt common (*n*) has heart-

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(*n*) Cyclamen Europæum *Lin.*

ſhaped angular leaves, marked with black in the middle. The flowers appear alone, before theſe, riſing immediately from the root: when they fall, the peduncles twiſt up like a ſcrew, incloſing the germ in the centre, and lay cloſe to the ground among the leaves, which grow very thick together, and protect them all winter. The common colour of the corol is red, but it varies to purple and white. There is one ſort which has the leaves purple underneath; and another which has the veins only purple, and the upper ſide veined and marbled with white, the flowers white with a purple baſe. The Perſian ſort has leaves like the laſt in colour, but quite entire about the edges, the flowers large, pale purple with a bright red or purple baſe. All theſe and other differences, whether ſpecific or not, make a moſt agreeable variety, and are very beautiful.

There are two wild plants of this natural Order which I muſt recommend to your inſpection for their beauty. They grow in the water, and therefore you muſt procure them by another hand.

Marſh-Trefoil or *Bog-bean* (*o*) will diſcover itſelf to you immediately by the corol being fringed all over, it is funnel-ſhaped, with a ſhort tube, and the border divided beyond the middle; the colour white, and red on the

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(*o*) Menyanthes trifoliata *Lin.*

outſide; the ſtigma bifid; and the ſeed-veſſel a capſule of one cell. The ſpecies is diſtinguiſhed by its ternate leaves; whence and from its ſituation it has the name of *Marſh-Trefoil*, and becauſe each of the component leaves is of the ſize and ſhape of a bean-leaf, it is alſo called *Bog-bean*. The flowers grow in a looſe ſpike at the top of the ſtem.

Water-Violet (*p*) has a ſalver-ſhaped corol not fringed, the tube longer than in the laſt, the colour white or faint purple with a yellow eye: the ſtamens are placed upon the tube of the corol; the ſtigma globoſe; and the ſeed-veſſel a capſule of one cell as in the laſt. The leaves are wholly immerſed in the water, and finely pinnate; the flower-ſtem is naked, and riſes five or ſix inches above water; towards the top are two or three whorls of flowers, and it is terminated with a cluſter of them; the whole forming a kind of conical ſpike.

Another natural Order of this Claſs contains the Plants entitled *Aſperifoliæ* or *rough-leaved*. Theſe are not ſo beautiful as the laſt; but you are by this time become too good a Naturaliſt, to be led away by gaudy colours, or ſpecious appearances. Though roughneſs of the leaves and ſtem is a general character of this order, yet it is more neceſſary that the following character ſhould be

(*p*) Hottonia paluſtris *Lin.*

found in the fructification. The calyx is of one leaf divided into five ſegments, and perſiſtent: the corol is monopetalous, divided alſo into five ſegments, tubulous, and extending below the germs: the five ſtamens grow from the tube of the corol: and there are four naked ſeeds, to which the calyx ſerves as a capſule. We may remark farther, that the leaves are placed alternately, or without order on the ſtem; and that the ſpike of flowers, before they open, is reflexed. With ſo ample a train of circumſtances to direct you, there cannot be much difficulty in knowing when you meet with one of this rough-leaved tribe of plants; eſpecially as they wear the ſame dreſs, and have a ſtrong family likeneſs.

Out of the 75 ſpecies which this Order contains, you may perhaps know ſome of the following, and from them you will have an idea of the reſt. Heliotrope or Turnſole, Mouſe-ear Scorpion-graſs, Gromwell, Alkanet, Hound's-tongue, Pulmonaria, Comfrey, Cerinthe, Borage, Bugloſs, and Viper's Bugloſs. If you examine the corol of theſe plants, you will obſerve that ſome of them have five ſcales in the tube of it, whilſt others have none; this circumſtance, together with the ſhape of the corol, will furniſh the principal generic diſtinctions. Thus Gromwell, Pulmonaria, Cerinthe, and Viper's Bugloſs have the tube of the corol naked; the reſt have the five ſcales. Heliotrope and Mouſe-ear Scorpion-graſs have ſalver-ſhaped flowers; Gromwell, Alkanet, Hound's-tongue, Pulmonaria, and Bugloſs have funnel-ſhaped flowers; in Comfrey and Cerinthe the corol is ventricoſe, ſwells or bulges out towards the top; Borage has a rotate corol; and in Viper's-Bugloſs it is an irregular kind of bell-ſhaped corol. Heliotrope has the ſcales, but the top of the tube is not cloſed by them, as it is in Mouſe-ear Scorpion-graſs, Alkanet, Hound's-tongue, Comfrey, Borage. Hound's-tongue has flat ſeeds, fixt to the ſtyle by their inner ſide only. Pulmonaria has a pentagonal or priſmatic calyx. Cerinthe has only two hard, ſhining bilocular ſeeds. Bugloſs has the tube of the corol bent.

Common Turnſole (*q*) has the leaves ovate, entire, wrinkled and covered with a nap; the lower ſpikes of flowers are ſingle, and the upper ones double. The colour of the corol white with a greeniſh eye, and ſometimes light red. This is an annual plant.

Peruvian Turnſole (*r*) has a ſhrubby ſtem; the leaves of a long ovate form, wrinkled and rough, on ſhort petioles; the flowers are produced at the end of the branches in ſhort ſpikes, growing in cluſters, the peduncles

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(*q*) Heliotropium Europæum *Lin.*
(*r*) Heliotropium Peruvianum *Lin.*

divide into two or three others, and theſe again into ſmaller ones, each ſuſtaining a ſpike of pale blue flowers, which have a peculiar odour.

Mouſe-ear Scorpion-graſs (*s*) is common both in dry paſtures and heaths, and by the ſides of ditches and ſtreams; in the former it is hairy, in the latter ſmooth, with the flowers much larger, and extremely beautiful when ſeen ſufficiently near, of a moſt elegant blue with a yellow eye. Linnæus diſtinguiſhes this ſpecies by the ſmoothneſs of the ſeeds, and by the tips of the leaves being callous.

There are two ſorts of Gromwell wild. The *true* Gromwell (*t*), which name is a corruption from *Gray Millet*, is not very common; it affects dry ſoils, eſpecially chalk, and is found chiefly in woody places, or among buſhes. You will know it by its whitiſh, ſhining, oval, hard ſeeds; which latter quality gave occaſion to the Latin name, from the Greek, *Lithoſpermum* (*u*). Or if it is not far enough advanced to ſhow the ſeeds; obſerve that it is a much larger and more branching plant than the next; the leaves are lance-ſhaped; the flowers are ſmall, and come out ſingle from the *alæ* of the leaves

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(*s*) Myoſotis ſcorpioides *Lin.*

(*t*) Lithoſpermum officinale *Lin.* (*u*) Stone-ſeed.

on ſhort peduncles; the corol is white or yellowiſh, with a greeniſh tube.

Corn Gromwell (*v*) is a common weed among corn, and differs from the former in its wrinkled, conical ſeeds; the leaves alſo are ovate, and ſharp-pointed; the flowers are chiefly on the top of the ſtem among the leaves; the corol is white, with the tube ſwelling at top. Both ſpecies have the corols ſcarcely extending beyond the ſegments of the calyx; and both have the roots tinged with red, whence the latter has the name of *Baſtard Alkanet.*

Hound's-tongue (*w*) is a large plant that grows common by the hedges and way-ſides; it has a ſtrong ſmell like that of mice in a trap. The corol is of a dirty red, or the colour of blood that has ſtood ſome time. It is diſtinguiſhed from the other ſpecies, by the ſtamens being ſhorter than the corol; the leaves broad lance-ſhaped, nappy, and ſitting cloſe to the ſtem without petioles.

Comfrey (*x*) is common by water-ſides. The leaves are large, long, hairy, and ending in a point; from their baſe on each ſide runs a border down the ſtalk (*y*). From the upper part of the ſtalk come out ſome ſide-

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(*v*) Lithoſpermum arvenſe *Lin.*

(*w*) Cynogloſſum officinale *Lin.*

(*x*) Symphytum officinale *Linnæi.*

(*y*) This is what Linnæus calls *decurrent.*

branches, with two ſmaller leaves, terminated by looſe bunches of nodding flowers; the corol of a yellowiſh white, in ſome places purple.

Of *Cerinthe* there are two ſpecies only, diſtinguiſhed by the larger ſort (z) having obtuſe, open corols; the leſs (*a*) ſharp, cloſe corols. The leaves of the firſt are ſea-green ſpotted with white; it varies with prickly and ſmooth leaves, with yellow and purpliſh red corols. It grows wild in Italy, the ſouth of France, Germany and Swiſſerland. The ſecond has more ſlender ſtalks; the calyx large, the corol ſmall and yellow. This is found naturally in the Alps. Both are not uncommon in gardens.

Borage (*b*) is an annual plant, which comes up in your kitchen garden, without the care of the gardener. The whole plant is rough; the leaves are large, and broad lance-ſhaped. The flowers come out in looſe, naked bunches, on long peduncles, at the end of the ſtalks: the calyx, with the corol ſpreads out quite flat: the colour of the corol is a fine blue, which ſometimes fades to white, or changes to red.

Bugloſs (*c*) is common among corn, and by way-ſides. Is a very rough plant, with blue corols veined with white.

(z) Cerinthe major *Lin.* (*a*) Cerinthe minor *Lin.*

(*b*) Borago officinalis *Lin.* (*c*) Lycopſis arvenſis *Lin.*

Viper's Bugloſs (*d*) is a much larger plant than this, with a large handſome ſpike of blue flowers. The ſtalk is very erect and ſpotted: the leaves lance-ſhaped, the lower ones petiolate, the upper ones ſeſſile. It is common among the corn in ſome countries; alſo in ſome paſtures, by way-ſides, and on walls.

You will find ſome plants of this fifth Claſs and firſt Order, which have a bell-ſhaped corol of one petal. If they have a perſiſtent calyx, divided into five parts, and a capſule for a ſeed-veſſel, they belong to a natural order entitled *Campanaceæ* (*e*). Three very large genera (*f*), beſides ſome others, belong to this order.

The genus *Convolvulus* (*g*) is diſtinguiſhed from all others, by its large, ſpreading, plaited corol, with the edge either marked with ten notches, or ſlightly quinquefid; two ſtigmas; and a capſule wrapped up in the calyx, generally bilocular, with two roundiſh ſeeds.

From this genus I will ſelect two wild

(*d*) Echium vulgare *Lin.*

(*e*) Bell-flowers.

(*f*) Convolvulus, Ipomæa, and Campanula: the firſt has 52; the ſecond 21; and the third 44 ſpecies.

(*g*) So called from twining round any thing it comes near; this property however is not common to all the ſpecies.

and two cultivated ſpecies, for your examination.

Small Bindweed (*h*), that is ſo common a weed among corn, has ſagittate leaves (*i*) acute both ways, and one flower upon a round long peduncle. The weak ſtalks trail on the ground, unleſs they meet with ſome other plant to ſupport them; the corol is either white, or red, or variegated, and if the plant came from India it would be cultivated for the beauty of the flower; I do not however recommend you to grow fond of it, for it creeps intolerably at the root.

Great Bindweed (*k*) has ſagittate leaves as well as the laſt, but truncate or cut off behind; the flowers come out ſingle alſo, but on ſquare peduncles. This is a much larger, ſtronger plant than the other, riſing in hedges or among buſhes and ſhrubs, ten or twelve feet high: the corol is very large and always pure white; immediately under the calyx is a large heart-ſhaped involucrum of two leaves. The former ſpecies has theſe two leaves, but they are very narrow, and in the middle of the peduncle.

Purple Bindweed (*l*), an annual ſpecies cultivated in flower gardens under the name of

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(*h*) Convolvulus arvenſis *Lin.*

(*i*) Shaped like the head of an arrow.

(*k*) Convolvulus ſepium *Lin.*

(*l*) Convolvulus purpureus *Lin.*

Convolvulus major, has heart-ſhaped undivided leaves, the ſeed-veſſels hanging down after the flower is gone, and the peduncles ſwelling. This if ſupported will climb to the height of ten or twelve feet. Though the moſt uſual colour of the corol is purple, yet there are varieties white, red, and whitiſh blue.

Tricolor Bindweed (*m*), or as it is vulgarly called, *Convolvulus minor*, has lance-ſhaped, ſmooth leaves, a weak falling ſtalk, that never climbs, and the flower coming out ſingly. The corol is a beautiful blue with a white eye; but ſometimes all white or variegated. This is alſo annual. Its native country is Portugal. The former is wild both in Aſia and America.

This genus contains ſeveral remarkable plants; as *Scammony*, *Turpethum* or *Turbith*, and *Jalap*.

Ipomœa has rather a funnel-ſhaped than a campanulate corol; a globoſe ſtigma, and a trilocular capſule: but the plants that range under this genus being natives of the Weſt Indies, and conſequently requiring much heat to raiſe and preſerve them, may probably not come within your view, and therefore I ſhall not enlarge upon them.

In *Campanula* you will of courſe expect to find a campanulate or bell-ſhaped corol: but

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(*m*) Convolvulus tricolor *Lin.*

it is worth your obſervation that the bottom of it is cloſed with five valves, concealing the receptacle, and that the ſtamens take their riſe from theſe valves. The ſtigma is trifid. And the ſeed-veſſel is a capſule, below the flower, having three or five cells, and at the top of each a hole, through which the ſeeds are ſcattered when ripe. You ſee by this time how curious and how various the ſtructure of the parts of fructification is. By thus examining them ſingly, and comparing them one with another, you will in time grow ane minent Botaniſt, and acquire a facility in determining the genus, ſpecies, analogy and connection of Vegetables.

There is a little *Bell-flower* that grows frequent in dry paſtures, and on almoſt every heath and common, with its nodding blue corol anſwering well to its name. The Botaniſts have conſpired to call it *round-leaved* Bell-flower (*n*) ; for what reaſon perhaps you will wonder, ſince you will diſcover no leaves upon the ſtem but what are linear, or very long, narrow lance-ſhaped ; if however you take a young plant, or at leaſt one in full vigour, and ſearch among the graſs cloſe to the ground, you will ſee theſe leaves, which are not ſo properly round, as heart (*o*) or kidney ſhaped (*p*). This ſort flowers the

(*n*) Campanula rotundifolia *Linnæi.*

(*o*) Haller. (*p*) Linnæus.

latter part of the ſummer, and all the autumn, 'till froſt puts an end to it; and frequently has a white corol. *Rampion* (*p*) which was formerly cultivated for its roots to eat in ſallads, is now ſo much neglected, that your kitchen garden perhaps may not furniſh it; and in its wild ſtate it is by no means common. This has upright ſtalks two feet high; the leaves undulating, thoſe next the root, ſhort lance-ſhaped inclining to oval: towards the upper part of the ſtem, and cloſe to it, ſmall bell flowers are produced, with a blue or white corol.

Peach-leaved Bell-flower (*q*) is abundant in your flower borders, both blue and white; but ſince your gardener has obtained the double ſorts, he has probably deſpiſed the ſingle ones ſo much as to have deſtroyed them, and at the ſame time to have deprived you of the power of determining the genus: you will however know this to be a Campanula by its air, and you will determine the ſpecies by the leaves, which are ovate next the root, and on the ſtalk are very narrow lance-ſhaped approaching to linear, ſlightly ſerrated about the edge, ſit cloſe to the ſtem, and are remote from each other.

I remember your hall chimney uſed to be adorned in ſummer with the *pyramidal* or

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(*p*) Campanula Rapunculus *Linnæi.*

(*q*) Campanula Perſicifolia *Linnæi.*

ſteeple Bell-flower (*r*), ſtrutting out like a fan, by means of a frame of little ſticks. This has ſmooth, heart-ſhaped leaves, ſerrated about the edge; thoſe on the ſtem lance-ſhaped: the ſtems are ſimple and ruſh-like: the flowers come out in ſeſſile umbels from the ſide of the ſtem. Such are Linnæus's ſpecific characters.

There is the *Giant Throatwort* (*s*), wild, but not common, in buſhy places and hedges: known by its ſtrong, round, ſingle ſtalks; its long ovate leaves, inclined to lance-ſhaped, ſlightly ſerrated or toothed like a ſaw on their edges: towards the upper part of the ſtalk the flowers come out ſingly upon ſhort peduncles. Pray remark that after theſe are faded, the ſeed-veſſels turn downwards till the ſeeds are ripe, and then riſe up again.

Great Bell-flower (*t*), vulgarly called *Canterbury Bells*, is much more common, in the like places. This has ſtiff, hairy, angular ſtalks, putting out a few ſhort ſide-branches. The leaves are like thoſe of nettles, hairy, and deeply ſerrated on their edges: towards the upper part of the ſtalks, the flowers come out on ſhort trifid peduncles, and have hairy calyxes.

(*r*) Campanula pyramidalis *Linnæi.*

(*s*) Campanula latifolia *Lin.*

(*t*) Campanula Trachelium *Lin.*

Small Canterbury Bells (*u*) is common in paſtures, eſpecially in a chalky ſoil. In dry places, it is very ſmall, and in a moiſt ſoil will grow to the height of two feet. The ſtalk is hairy, angulate, and unbranched; the lower leaves are broad, and pedunculate; thoſe on the ſtalk, long, narrow, ſitting cloſe to the ſtalk, and even embracing it: towards the top of the ſtalk, from the *alæ* of the leaves, two or three flowers come out together, and a larger bunch terminates it: the flowers are ſeſſile.

Venus's Looking-glaſs (*v*) is a Campanula, with a weak, low and very branching ſtalk; the leaves oblong, and a little notched; the flowers ſolitary, and the ſeed-veſſels of a priſmatic form. *Corn-bell-flower* (*w*) very much reſembles this; but the ſtalk is ſtiff, and branches little; the leaves are more deeply notched, and waving; the flowers come out in parcels, and the calyx is longer than the corol. This is a common weed among corn. Theſe two have ſcarcely bell-ſhaped corols; any more than another plant of this Campanulate Order, entitled *Greek Valerian* or *Jacob's Ladder* (*x*), which

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(*u*) Campanula glomerata *Linnæi.*
(*v*) Campanula ſpeculum *Lin.*
(*w*) Campanula hybrida *Lin.*
(*x*) Polemonium cæruleum *Lin.*

has the corol rather rotate, with the tube ſhorter than the calyx, but cloſed with five valves, into which the ſtamens are inſerted, as in *Campanula:* the ſtigma alſo is trifid, as in that, and the ſeed-veſſel a trilocular or three-celled capſule, but incloſed within the flower. The circumſtances that diſtinguiſh this from the other two ſpecies are, that the leaves are pinnate, the flowers erect, and the calyx full as long as the tube of the corol; in which you ſee it recedes a little from one character of the genus. It is blue, and cut into five roundiſh ſegments. I ſcarcely need caution you not to be miſled by names, which being uſually given by ignorant perſons, are very fanciful or erroneous. Thus here, you may as well ſuppoſe *Polemonium* to have an affinity with a ladder, as with Valerian: indeed the ſame circumſtance of the pinnate leaves probably gave occaſion to both names.

I am almoſt afraid to preſent you with a ſet of plants, which from their lurid, duſky, diſmal, gloomy appearance, are kept together under the title of *Luridæ.* They have alſo moſt of them a diſagreeable ſmell, which, with their forbidding look, will deter our young Couſin, from examining them, ſhe not being yet ſufficiently tinctured with enthuſiaſm to go on in ſpite of ſuch circumſtances. Indeed I would not wiſh her to be too buſy with ſome of theſe *inſane roots* *that take the reaſon priſoner*, and which I can never collect and examine myſelf, without their affecting my head. You will conſider, that nature has kindly given us notice in general of approaching danger, by means of our ſenſes; and accordingly ſome of theſe *lurid* plants are highly poiſonous; moſt of them are ſo in ſome degree, though ſoil and climate may mitigate the poiſon, and even render them wholeſome. I will ſelect ſome of the leaſt diſagreeable in ſmell and appearance; or if they are otherwiſe, will announce it to you. Beſides the circumſtances of five ſtamens and one piſtil, theſe plants agree in a perſiſtent calyx, divided more or leſs deeply into five ſegments; a monopetalous corol, divided alſo into five ſegments, tubulous, irregular; the ſeed-veſſel bilocular, and either a capſule or a berry, incloſed within the flower.

Of *Verbaſcum* or *Mullein* there are ſeveral ſpecies wild, one very common, and another not uncommon. Their general characters are, that the corol is rotate, and ſlightly irregular; the ſtamens unequal in length, bending down, and generally cloathed at bottom with a coloured fringe; the ſtigma obtuſe; and the capſule bivalve and opening at top.

The common ſpecies is the *Great* or *Hoary Mullein* (*y*), which grows moſtly under

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(*y*) Verbaſcum Thapſus *Linnæi.*

banks or hedges. It is a biennial plant; the firſt year forming its root, and a ſet of large, broad leaves, extremely woolly on both ſides, and ſpreading upon the ground, with ſcarcely any petioles: the ſecond year it ſends up a ſingle ſtem, ſometimes five feet in height, with decurrent leaves on it, woolly as the radical ones; and on the top a cloſe ſpike of yellow flowers, which have an odour not diſagreeable.

The other which I hinted at is the *Black* Mullein (z), which grows in ſimilar places, abundantly in ſome, but by no means ſo extenſively. It has not ſo high a ſtem; the ſhape of the lower leaves is that of a heart much lengthened out, and they are petiolate; the leaves on the ſtem ovate, ſharp-pointed and ſeſſile; all of them are pale green on the upper, and hoary on the under ſurface; and are indented about the edges. The ſtalk is terminated by a long ſpike of yellow flowers, formed by ſhort cluſters or *ſpiculæ* on the ſides of the principal ſtalk. The corol is yellow with the filaments fringed or bearded with purple. It has the name of black, I preſume, merely becauſe it is not white, like the other.

Datura, Stramonium or *Thorn-apple,* has the calyx tubulous, ſwelling in the middle, five-cornered and deciduous; the corol funnel-ſhaped, ſpreading out gradually very wide from a long cylindric tube, into a pentangular border with five plaits: the capſule is quadrivalve, or opens into four parts. The flowers of theſe are large, and rather ſpecious, and the capſules are remarkable for their ſize.

(z) Verbaſcum nigrum *Lin.*

The *common* Thorn-apple (*a*) has ſmooth leaves, irregularly angular, and ſmelling diſagreeably; the flowers come out from the firſt diviſions, and near the extremities of the branches; the corol is white, and each angle of it ends in a long point; the capſule is ovate, covered with ſtrong thorns, and grows erect.

Another ſort (*b*), cultivated ſometimes in flower gardens, has purple flowers; it has alſo purple ſtalks, which are ſtouter and taller than thoſe of the laſt; the leaves are alſo larger, and more angulated and notched; the capſule is larger, but much like that of the common ſort. One of them, having the capſule armed with very ſtrong ſpines, has the epithet of *fierce* (*c*).

Henbane (*d*) is a very common plant, and has often done miſchief to ſuch as will not ſuffer their appetites to be corrected by their ſenſes. You will agree with me that the

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(*a*) Datura Stramonium *Lin.*

(*b*) Datura Tatula *Lin.* (*c*) Datura ferox *Lin.*

(*d*) Hyoſcyamus niger *Lin.*

ſmell is ſufficient to deter any perſon from eating it. I cannot however diſpenſe with your examining the flower, which is really beautiful on a near view. The corol is funnel-ſhaped, and obtuſe; of a pale yellowiſh colour, beautifully veined with purple. The ſtamens are of different lengths and bent: and the capſule is involved in the calyx, is of an oval form, and covered with a hemiſpherical lid, which by falling off announces that the ſeeds are ripe.

The common wild ſpecies is diſtinguiſhed from the others by its ſinuate leaves, embracing the ſtalk, and by the flowers ſitting cloſe to it. The whole plant is covered with long hairs, from which exudes a clammy, fetid juice; the leaves are very large and remarkably ſoft; and the flowers come out in a very long ſpike, rather on one ſide. It grows on banks, dunghills, and way ſides about villages, and is a biennial plant. There are other ſorts, but neither wild, nor much cultivated.

You who have ſuch an averſion from Tobacco in all the ways of uſing it, will not be diſpleaſed at finding it in this lurid order. Notwithſtanding it is ſo generally taken, the oil of it is the ſtrongeſt of the vegetable poiſons. It is a plant however neither unornamental, for your garden; nor dangerous, or even diſagreeable to examine. The eſſential generic characters are, that the corol is funnel-ſhaped, the border plaited; the ſtamens a little inclined; the ſtigma notched; the capſule ovate, marked with a furrow on each ſide, bivalve, and opening from the top.

Common or *broad-leaved* Tobacco (*e*) is diſtinguiſhed by its broad lanceolate leaves, which are about ten inches long, and three and an half broad, ſmooth, ending in acute points, and ſitting cloſe to the ſtalks: the corols are of a bright purple, and end in five acute points. There is a ſort like this, or perhaps a variety of it, called *Oroonoko* Tobacco, which is a larger plant, the leaves more than a foot and half long, and a foot broad, very rough and glutinous; the baſe embracing the ſtem: the corols are of a pale purple.

Another ſpecies called *Engliſh* Tobacco (*f*), might eaſily be miſtaken for a Henbane, if you did not remark the regular form of the corol, and the want of a lid to the capſule. It is a lower plant than the others; the leaves are ovate, entire, and on ſhort petioles. The flowers come out in looſe bunches on the top of the ſtalks; the corol has a ſhort tube, ſpreading out into five obtuſe ſegments, of a greeniſh yellow colour. Though this has the epithet of Engliſh, you

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(*e*) Nicotiana Tabacum *Lin.*

(*f*) Nicotiana ruſtica *Lin.*

are not to ſuppoſe it to be an European plant, for it is a native of America, as well as all the other ſpecies, which are at leaſt ſeven in number.

How the ſame plant ſhould come to have the gentle appellation of *Bella-donna*, and the tremendous name of *Atropa* (g), ſeems ſtrange, 'till we know that it was uſed as a waſh among the Italian ladies, to take off pimples, and other excreſcencies from the ſkin ; and are told of its dreadful effects as a poiſon. Linnæus has joined them, making *Atropa* the generic, and *Bella-donna* the ſpecific or trivial title. The principal characters which he gives of the genus are theſe—the corol is bell-ſhaped ; the filaments grow from the baſe of it, are cloſe at bottom, but at top diverge from each other and are arched ; the ſeed-veſſel is a globoſe berry, ſitting on the calyx, which is large.

Our ſort, for there are ſix ſpecies of the genus, is a great branching plant, with ovate, entire leaves, and large flowers coming out among the leaves ſingly, on long peduncles ; the corol is of a duſky brown colour on the outſide, and of a dull purple within ; the ſtalks have a tinge of the ſame colour, as have alſo the leaves towards autumn. The berry is round, of a ſhining black when ripe, and not unlike a black cherry in ſize and colour; it contains a purple juice of a mawkiſh ſweetneſs, and has frequently enticed children to taſte it at their peril. I have known however the ſame poiſonous effects follow from eating the young ſhoots of the ſpring boiled, as from the crude berries of autumn. *Deadly Nightſhade* is rarely cultivated, and not common wild; it ſkulks in gloomy lanes, and uncultivated places, but is too frequent near villages in ſome countries.

(g) From *Atropos* the name of one of the Furies.

You have heard of the *Mandrake's Groan*, and "of ſhrieks, like Mandrakes torn out "of the earth:" ſuperſtition having endued this plant with a ſort of animal life, fatal to whoever preſumed to deſtroy it, by digging up the root. It was famous, as Opium now, for procuring ſleep; whence Cleopatra calls for *Mandragora*, "that ſhe might ſleep "out the great gap of time her Antony is "away." And the vile Iago boaſts that "not Poppy, nor *Mandragora*, nor all the "drowſy ſyrups of the world, ſhall ever "med'cine Othello to that ſweet ſleep which "he had yeſterday." Since Mandrake groans and ſhrieks when injured, it muſt needs have a human form; and accordingly ſuch have been carried about for ſale, notwithſtanding the danger that attends the procuring it; but this is cunningly avoided by tying a dog to the root, and thus making the blind fury of the poor Mandrake fall upon the innocent dog, inſtead of the aggreſſor. Theſe pretended Mandrakes, are ſaid to be roots of Angelica or Bryony, either cut into form, or compelled to grow through earthen moulds put into the ground for this purpoſe : they were uſed in magical incantations ; and though theſe are now pretty much out of faſhion, yet I have had them very gravely offered me for ſale. Linnæus formerly made this a diſtinct genus from the laſt, but on ſecond thoughts he has made it a ſpecies of Atropa (*h*), diſtinguiſhing it from the others, by its having no ſtems beſides the ſcapes which ſupport a ſingle flower. The root is like that of a Parſnep, ſometimes forked ; next the ground there is a circle of large, broad leaves ; the *ſcapes* or naked ſtalks that ſupport the flowers, are but about three inches long ; the corols are five-cornered, and of a greeniſh white or purpliſh colour ; the berry is as large as a nutmeg, and of a yellowiſh green. The root and leaves are ſtinking, and the whole plant is poiſonous, though in ſmall doſes it is uſed medicinally.

Another genus of this ſame natural order is *Phyſalis* ; the characters of it are theſe— the corol is wheel-ſhaped ; the filaments and anthers are connivent or bend towards each other ; and the ſeed-veſſel is a berry incloſed

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(*h*) Atropa Mandragora.

within the calyx, which grows to a large, inflated, coloured bladder. *Winter-Cherry* (*i*), of which you have ſuch abundance under your ſhrubs, is a ſpecies of this genus. The diſtinguiſhing marks are, that the leaves are double or conjugate, that is, come out in pairs, are entire about the edges, or but very ſlightly indented, and ſharp pointed; the ſtalk is herbaceous, and a little branching at bottom. The roots creep ſo as to be troubleſome; the ſtalks are only about a foot high; the leaves are of various ſhapes, and have long petioles: the flowers are produced ſingly from the *alæ* of the ſtalks on ſlender peduncles; and have a white corol, which with the calyx, leaves and ſtalks is hairy. This plant, which is ſo humble and inconſiderable all the ſummer, attracts your notice in autumn, by its great inflated calyx turning red, and diſcloſing the round red berry within it, about the ſize of a ſmall cherry.

But the principal genus of this natural order is the *Nightſhade*, or *Solanum*, whence ſome authors have entitled theſe plants *Solanaceæ*. There are no leſs than 34 ſpecies of them; of which I ſhall ſelect, as uſual, ſome wild and uncultivated ſorts, ſuch eſpecially as are either moſt important, or moſt likely to be within your reach.

(*i*) Phyſalis Alkekengi.

You will eaſily know the genus by its wheel-ſhaped corol; by its large anthers cloſed in the middle of the corol, and ſeeming to form but one body; and by its bilocular berry.

Some of the ſpecies have prickly ſtalks and leaves; others are unarmed: hence a commodious partition of the genus into two ſubdiviſions.

A ſhrubby, tall ſort, from the Madeiras, without any ſpines or prickles, has long been an inhabitant of the green-houſe, which it adorns with its ſplendid red berries all the winter: the gardeners know it by the name of *Amomum Plinii*; and it is often called *Winter Cherry* (*k*); ſuch is the dearth of diſtinctive names, and ſuch the confuſion ariſing from the want of a regular language, like that which Linnæus firſt introduced into Botany. The leaves are lance-ſhaped, and have a waving edge (*l*): the flowers grow in ſmall umbels, cloſe to the branches; the corol is white; and the berries are as large as a ſmall cherry; generally red, but ſometimes yellow.

Another ſhrubby ſort, without ſpines, is the *Woody Nightſhade*, or *Bitter-ſweet* (*m*), which grows commonly wild in moiſt hedges. This has a climbing, flexuoſe

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(*k*) Solanum Pſeudocapſicum *Lin.*

(*l*) Linnæus calls them repand.

(*m*) Solanum Dulcamara *Lin.*

ſtalk. the lower leaves lance-ſhaped, the upper ones ſometimes trifid: the flowers are in bunches, or branched cymes, coming out from the *alæ* of the leaves; the corol revolute, purple, marked with two ſhining green ſpots at the bottom of each ſegment; and the berries red.

Garden Nightſhade (*n*) is alſo unarmed, but not ſhrubby. It is an herb, and annual. The leaves are on long petioles, and being of a ſoft texture, are inclined to hang down. They are of an ovate or rhomboid form, with long points, angulate and notched about the edges: the flowers grow on a kind of nodding umbel; the corol is white, and the berry is black. It is a common weed on dunghills, in gardens, and other richly cultivated places. It varies with yellow and red berries; and in the form of the leaves.

Potatoe (*o*) is of this genus, as you will be convinced, if you compare the ſtructure of the flower, with that of the other ſpecies. Linnæus characteriſes it by theſe diſtinctions —that the ſtalk is herbaceous and unarmed, the leaves pinnate and quite entire, the peduncles ſubdivided: the corols are either purple or white, and the berry is large.

Tomatos or *Love-apples* (*p*) is another ſpe-

(*n*) Solanum nigrum *Lin.*

(*o*) Solanum tuberoſum *Lin.* The Engliſh name is evidently a corruption of the Indian *Batatas*.

(*p*) Solanum Lycoperſicum *Lin.*

cies of Nightſhade, which is alſo admitted to the table, and eaten with impunity, in ſpite of the ill neighbourhood in which it is found. This has an unarmed, herbaceous ſtem, which is very hairy; the leaves alſo are pinnate, but cut; and the flowers are born on ſimple unbranched bunches; the corol is yellow, and the fruit or berry is large, flatted, and deeply furrowed.

Melongena or *Mad-Apple* (*q*) is alſo of this genus; it is cultivated as a curioſity for the largeneſs and ſhape of its fruit; and when this is white, it has the name of *Egg-plant*; and indeed it then perfectly reſembles a hen's egg in ſize, ſhape and colour. The ſtem of this is herbaceous, and without prickles; the leaves ovate and nappy; the peduncles pendulous, and growing thicker towards the top, and the calyxes unarmed. The corols are purple, and the fruit varies much in colour. The three laſt ſpecies recede a little from the character of the order; for the Potatoe and Tomatos have many cells to the fruit, and this has but one.

The prickly ſorts of *Solanum* are natives of hot countries, and moſt of them are brought to us from the Spaniſh Weſt Indies: they will not therefore commonly fall under your obſervation.

(*q*) Solanum Melongena *Lin.*

Capſicum or *Guinea Pepper* is alſo of this lurid order; its beauty and uſe lies in the fruit, which Linnæus calls a dry or juiceleſs berry, and others a capſule or pod. This circumſtance, together with the rotate form of the corol, and the anthers being connivent, make up the eſſential characters of the genus. Linnæus has only four ſpecies, one annual (*r*), with an herbaceous ſtem, the reſt perennial with woody ſtems (*s*). Others make many more ſpecies from the different form of the fruit; which indeed varies much both in ſhape, in colour, and intermixt with the white flowers and green leaves, makes a pleaſing variety: but Linnæus does not allow the form of the fruit in this genus to be permanent enough to conſtitute ſpecific differences. They are all very hot, and hence have the names of *Bell-Pepper*, *Hen-Pepper*, *Barberry-Pepper* and *Bird-Pepper*. The *Bell-Pepper*, which has large, ſwelling, wrinkled fruit, with a fleſhy tender ſkin, of a red colour when ripe, is the only ſort fit for pickling. *Cayan-Pepper* is made from the laſt, whoſe fruit is ſmall, oval, of a bright red, and much more pungent than the reſt. Moſt ſorts of Capſicum come from both Eaſt and Weſt Indies. Though they are uſed in hot countries ſo univerſally with their food, yet

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(*r*) Capſicum annuum.

(*s*) Capſicum baccatum, groſſum & fruteſcens.

the ripe fruits thrown on the fire will emit ſtrong noiſome vapours, which occaſion violent ſneezing, coughing, and often vomiting, in thoſe who are near; and mixt in ſnuff will have the ſame effects to a violent and dangerous degree: ſo that theſe plants, though not ſtrictly poiſonous, are however worthy a place in the lurid tribe.

In this firſt Order of the fifth Claſs are to be found ſeveral well known Shrubs; among which the *Honey-ſuckle* is eminent. Of theſe the *Italian* (*t*), and *Wild* (*u*) ſpecies are the principal. They are diſtinguiſhed by the firſt having the upper pairs of leaves connate, or ſo joined as to form but one, and the ſtalk running through the middle of them: whereas in the wild Honey-ſuckle they are all diſtinct. The Dutch or German Honey-ſuckle of the gardens is ſuppoſed to be a variety only of this, though it is much ſtronger, and not ſo apt to climb. The Woodbind has indeed very ſlender trailing branches, twining round the boughs of trees, and climbing to the very tops of them.

Trumpet Honey-ſuckle (*v*) is a North American; it agrees with the Italian in having the upper leaves connate; with the Woodbind in its ſlender trailing branches:

(*t*) Lonicera Caprifolium *Linnæi.*

(*u*) Lonicera Periclymenum *Lin.* Woodbind.

(*v*) Lonicera ſempervirens *Lin.*

but differs from both, in the whorls of flowers being naked or void of leaves, and the corols being almoſt regular; the leaves alſo are evergreen, and the corols are bright ſcarlet on the outſide, and yellow within.

There are other ſpecies, which you will find among the ſhrubs, differing in appearance, and receding ſomething in character, from Honey-ſuckles properly ſo called. Theſe have always two flowers only coming out together; whereas in the former the flowers grow in whorls or heads many together. *Fly* Honey-ſuckle * has the two berries that ſucceed the two neighbouring flowers diſtinct; the leaves are entire and hoary; and the corols are white. *Red-berried upright* Honey-ſuckle (*w*) has the two berries joined together; the leaves lance-ſhaped and ſmooth; the corols are red on the outſide, but pale within. This is not ſo tall growing a plant as the other.

The five recited ſpecies agree in having a monopetalous irregular corol, except that in the Trumpet Honey-ſuckle it is almoſt regular; in the genuine Honey-ſuckles the tube is remarkably long. The ſeed-veſſel in all is a berry, growing below the flower, and incloſing ſeveral ſeeds: though the laſt has only two.

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* Lonicera Xyloſteum *Lin.*

(*w*) Lonicera alpigena *Lin.*

The numerous genus of *Rhamnus*, containing 24 ſpecies, is alſo of the firſt order in the claſs *Pentandria:* theſe are either thorny, prickly, or unarmed. *Buckthorn* (*x*) is one of the firſt; having thorns terminating the branches, the ſtem erect, the leaves ovate, and the calyx cut into four ſegments: the berries have four ſeeds in them, and if you wet them and rub them on white paper, they will ſtain it of a green colour. I mention theſe two circumſtances, becauſe they who gather the berries for ſale are apt to mix others with them, and I know you will be intereſted in them, when I inform you, that the fine green colour (*y*), which you uſe in your miniature painting, is made from theſe berries. If you ſhould have the curioſity to ſearch the hedges for them, in order to make this paint yourſelf; you muſt not be ſurpriſed if you do not find them on every Buckthorn ſhrub; for all the flowers are incomplete, ſome plants having them with ſtamens, others with a piſtil only; and the former of theſe are never ſucceeded by fruit.

Berry-bearing Alder (*z*) is one of the unarmed ſpecies. It grows in woods, is a black looking ſhrub, with bunches of inconſiderable

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(*x*) Rhamnus catharticus *Lin.*

(*y*) Verd de veſſie.

(*z*) Rhamnus Frangula *Lin.*

herbaceous flowers with a quinquefid corol, ſucceeded by black berries containing 4 ſeeds: the leaves are ovate, ſmooth, and quite entire.

Another of the unarmed diviſion is the *Alaternus* (*a*), formerly ſo ſhorn and beclipped in hedges, and covering of walls; but now ſeen chiefly among other evergreens, taking its natural form. The leaves are extremely ſhining, generally notched or ſerrate about the edges: the flowers have a trifid ſtigma, and are incomplete, like thoſe of the Buckthorn: the corol is quinquefid, and the berry has three ſeeds. There are ſeveral varieties of *Alaternus*, differing in the ſhape of the leaves, and depth of the ſerratures; they are alſo ſometimes blotched or variegated. This ſhrub is frequently confounded with *Philyrea*, from which it may be known at all times by the poſition of the leaves, which is alternate in this, and oppoſite in that: when the two ſhrubs are in flower, you perceive other more eſſential diſtinctions.

Paliurus or *Chriſt's-thorn* (*b*) is one of the prickly diviſion. It has double prickles, the under ones reflexed; and is another inſtance of irregularity in this genus, the germen being trilocular, ſurrounded by a membranaceous

(*a*) Rhamnus Alaternus *Lin.*
(*b*) Rhamnus Paliurus *Lin.*

rim,

rim, and crowned by three ſtyles. It has a pliant weak ſtem requiring ſome ſupport; the flowers grow in cluſters, and are of a greeniſh yellow colour: the corols are quinquefid. Being very common in Paleſtine, it is ſuppoſed to be the thorn with which our Saviour was crowned.

The common character of all theſe is, that there is only a calyx or corol, with five ſmall ſcales, one at the baſe of each diviſion, bending towards one another, and defending the ſtamens; the ſeed-veſſel a roundiſh Berry, divided within into fewer parts than the corol or calyx.

Currants and Gooſeberries (*c*), the Ivy (*d*) and the Vine (*e*), are alſo of this order *Monogynia*; but being ſo well known to you and every body, I will not dwell on them, having already run out this letter to ſo great a length.

Some other trees and ſhrubs are leſs known, becauſe they are the growth of hotter climes. Such is the *Coffee (f)*, originally of Arabia, though now common in both the Indies. It is known by its ſalver-ſhaped corol, with the ſtamens growing upon the tube of it: and by its ſeed-veſſel, which is a berry, below the flower, containing two ſeeds,

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(*c*) Ribes *Linnæi.*

(*d*) Hedera Helix *Lin.*

(*e*) Vitis vinifera *Lin.*

(*f*) Coffea Arabica *Linnæi.*

ſeeds, and they covered with an *aril,* or detached coat. This tree does not grow above 16 or 18 feet high; the leaves are large, of a lucid green, lance-ſhaped, and waving about the edges. The flowers are produced in cluſters, cloſe to the branches; the corols are quinquefid, of a pure white colour, and a very grateful odour. It is an ever-green, and at all times makes a beautiful appearance.

Ceſtrum or *Baſtard Jaſmine* is a ſhrub of the Weſt Indies, and therefore requires a ſtove to keep it alive in theſe northern countries. It has a funnel-ſhaped corol; the filaments have a little proceſs in the middle; and the ſeed-veſſel is a unilocular berry, containing ſeveral ſeeds. One ſpecies (*g*), has cluſters of herbaceous flowers on ſhort peduncles, ſmelling ſweetly in the night. And another (*h*), with leaves of a lively green, and great conſiſtence, has cluſters of white flowers, ſitting cloſe to the ſtalk, ſmelling ſweet in the day time.

Dioſma is a genus of ſhrubs from the Cape of Good Hope. Theſe are of another phalanx, having five petals to the corol, which is inferior, or incloſes the ſeed-veſſel. The germ alſo is crowned with five nectaries, and becomes three or five united capſules, con-

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(*g*) Ceſtrum nocturnum *Lin.*
(*h*) Ceſtrum diurnum *Lin.*

taining each one ſeed, with an elaſtic *aril* involving it. The flowers are ſmall, but elegant; white, and of an agreeable ſpicy odour.

Other foreign trees and ſhrubs of this claſs and order are, the *Iron-wood tree* (*i*), the *Phylicas*, the *Mango-tree* (*k*), and ſome others: but ſince it is not probable that you will meet with theſe, I have not troubled you with their characters, or any account of them.

There remain ſome ſpecious plants to be noticed, which are commonly cultivated in flower-gardens for their beauty. Such are all the ſpecies of *Lychnidea* (*l*): which you will know by their ſalver-ſhaped corol, with a bent tube; their filaments of unequal length; their trifid ſtigma; their priſmatic calyx; their three-celled capſule, with one ſeed in each cell. They are perennial plants, the corols of moſt of the ſpecies are large, and of a purple colour; and the leaves are lance-ſhaped. They are the produce of North America.

Upon the firſt diſcovery of the New World, as America was vauntingly called, every thing found there was repreſented as wonderful. Strange ſtories were related of the plants and animals they met with, and thoſe which

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(*i*) Sideroxylon. (*k*) Mangifera Indica *Lin.*

(*l*) Phlox *Linnæi.*

which were ſent to Europe had pompous names given them. One of theſe is the *Marvel of Peru,* the only wonder of which is the variety of colours in the flower. It appertains to this claſs and order, and has the following generic marks—the corol is funnel-ſhaped, the ſtigma globoſe; and there is a globoſe Nectary incloſing the germ, which afterwards hardens to a kind of nut. There are three ſpecies: firſt, the common Marvel of Peru (*m*), which has ſo much variety of colour in the flowers of the ſame plant; theſe are produced plentifully at the ends of the branches, and in hot weather do not open 'till towards evening; but when it is cool covered weather, continue open the greateſt part of the day. Secondly, that whoſe root was ſuppoſed, though erroneouſly, to yield the Jalap (*n*); the ſtalks of this are ſwollen at the joints, the leaves are ſmaller, and the flowers ſit ſingly, cloſe in the *alæ* of the leaves: they are not variable, but all of a purpliſh red, and not much more than half the ſize of the others: the fruit alſo is very rough. In the Weſt Indian iſlands, where it is very common, they call it *four o'clock flower.* Thirdly, the *long-flowered* Marvel of Peru (*o*), whoſe corols are

(*m*) Mirabilis Jalapa *Lin.*
(*n*) Mirabilis dichotoma *Lin.*
(*o*) Mirabilis longiflora *Lin.*

white, and have remarkably long tubes; they have a muſky odour, and keep cloſe ſhut all the day, expanding as the ſun declines: they grow in bunches like the firſt ſort, and the ſeeds are rough like the ſecond: this differs from both the others in having weak ſtalks that require ſome ſupport; and theſe, with the leaves, are hairy and viſcous. This ſpecies is from Mexico, and has not been long known.

The *Creſted Amaranth* belongs alſo to this place, it is commonly called *Cock's-comb*, from the form in which the head of flowers grows. It ranges in the diviſion of incomplete, inferior flowers: and the generic characters are—that the exterior calyx conſiſts of three dry, coloured leaves, within which is a corol or ſecond calyx, conſiſting of five ſtiff, ſharp-pointed leaves: that there is a ſmall rim ſurrounding the germ, from which the filaments take their riſe: and that the ſeed-veſſel is a round capſule, opening horizontally, and containing three ſeeds.

There are many ſpecies; but that which is ſo much eſteemed for the variety of form and colours in its fine creſt of flowers, is diſtinguiſhed by oblong ovate leaves; round, ſtriated peduncles; and oblong ſpikes (*p*). The colours are red, purple, yellow, white and variegated; and ſome are like a fine

(*p*) Celoſia criſtata *Linnæi.*

plume of ſcarlet feathers. You muſt not however confound theſe plants with the *Amaranth* or *Prince's Feather*, which you will find in a place far diſtant from this.

One Natural Order more ſhall, if you pleaſe, conclude your labours, and my prate, for the preſent. It has its name (*q*) from this circumſtance of the diviſions of the corol being turned or bending in the ſame direction with the apparent motion of the ſun. But beſides this ſingularity, the flowers of this order have a one-leafed calyx divided into five ſegments; a corol of one petal; and a fruit conſiſting of two veſſels, containing many ſeeds. In moſt of the *genera* theſe fruits are *follicles* (*r*). The corols in the greater part are *funnel-ſhaped*; and are furniſhed with a remarkable *Nectary*.

The common Periwincle, which covers the ground and creeps about the bottoms of the hedges, in many parts of your plantations, may ſerve you very well for an example of this order. It has a ſalver-ſhaped corol, ſucceeded by two erect follicles which contain ſeeds, that are called naked or ſimple, to diſtinguiſh them from thoſe of ſome other genera, which are winged. You will obſerve alſo that the tube of the corol forms

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(*q*) Contortæ *Lin.*

(*r*) This is a dry ſeed-veſſel, of one cell and one valve; the ſeeds lie looſe in a down, and the ſhell opens on one ſide to let them eſcape.

a pentagon at top; nor will it eſcape you, that there are two large ſtigmas, one over the other.

Linnæus will not allow that the little running ſort (*s*), and the upright one with larger flowers (*t*), are diſtinct ſpecies. Without entering into any controverſy on a matter not eaſy to ſettle; you know them as under not only by their ſize, but by the ſtalks of the firſt lying on the ground, and the leaves being narrower and ſharp-pointed towards either end, that is lance-ſhaped, and on very ſhort petioles; whereas the ſtalks of the ſecond are upright, and will climb a little, and the leaves are hollowed at the baſe and ovate, ſharper pointed at the end, and on longer petioles.

There is a third ſort called *Upright* Perivincle (*u*), for which we are obliged to the Iſland of Madagaſcar, and of courſe it requires the protection of a ſtove, in our colder climates. It has a ſtiff, upright, branching ſtalk, woody at bottom; the leaves are of an oblong-ovate ſhape, ſmooth and ſucculent, and ſitting pretty cloſe to the branches; from the *alæ* of theſe come out the flowers, on very ſhort peduncles, generally ſingle, but ſometimes two together: the tube of

(*s*) Vinca minor *Lin.*
(*t*) Vinca major *Lin.*
(*u*) Vinca roſea *Lin.*

the corol is long and ſlender; the brim very flat, the upper ſurface of a bright crimſon or peach colour, the under of a pale fleſh colour; and there is a conſtant ſucceſſion of theſe beautiful flowers from February to October. The corol is ſometimes white.

The *Oleander* (*v*) is one of the moſt beautiful plants of this tribe. The genus has two erect follicles, like the laſt; but the ſeeds incloſed in them are downy; there is a ſhort crown alſo terminating the tube of the corol, cut into narrow ſegments, and the diviſions of the corol are oblique to the tube. This ſhrub grows to the height of eight or ten feet; the branches come out by threes from the main ſtem; and the leaves alſo come out by threes from the branches on very ſhort petioles, point upwards, are very ſtiff, and end in ſharp points. The flowers come out in bunches at the ends of the branches; the corol is of a bright purple, varying to crimſon or white. It grows wild in ſeveral countries about the Mediterranean Sea, but with us is generally kept in tubs, not being hardy enough to ſuſtain the ſeverity of all our winters.

But the moſt admired of this tribe is the *Cape Jaſmine* (*w*), which was firſt diſcovered near the Cape of Good Hope by the ſuperior

(*v*) Nerium Oleander *Lin.*
(*w*) Gardenia florida *Linnæi.*

fragrancy of its flowers. The diviſions of the calyx are uniform and vertical, and the ſeed-veſſel is a two or four-celled berry, below the flower. The branches come out by pairs; and the leaves are oppoſite, cloſe to the branches, of a ſhining green and thick conſiſtence: the flowers are produced at the ends of the branches; the corol is of one petal only, but cut into many ſegments, of which it has ſometimes three or four rows, and then it is as large and as double as a Roſe: the anthers are inſerted on the tube without filaments: the colour of the corol is white, changing as it decays to a buff-colour; and the odour is that of Orange flowers or Narciſſus.

There is another plant of this order of twiſted corols, called alſo a *Jaſmine* with the addition of *Red*, but of a very different genus from the Jaſmines properly ſo called. *Plumeria* or *Red Jaſmine* has two reflexed follicles, with the ſeeds flat, winged and imbricate. There are four or five known ſpecies, all natives of the Spaniſh Weſt Indies, except one, which comes from Senegal. The ſort moſt known (*x*) has oblong ovate leaves, with two glands upon the petioles: it grows to the height of 18 or 20 feet; the ſtalks abound with a milky juice, and towards the top put out a few thick

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(*x*) Plumeria rubra *Linnæi.*

ſucculent branches, at the ends of which come out the flowers in cluſters, ſhaped like thoſe of the Oleander; of a pale red colour, and having an agreeable odour. Theſe being never ſucceeded by the fruit in our northern climes, you will not be able to diſcern the generic character.

The famous *Jeſuits Bark* is from a tree of this claſs and order *(y)*, approaching in its characters to the natural tribe of *Contortæ*: to which alſo belong ſome plants of the ſecond order of this fifth claſs, becauſe they have two piſtils: ſuch are the *Periplocas*, the *Cynanchums*, and the numerous genus of *Aſclepias* containing 22 ſpecies. Of this laſt, you have the common *Swallow-wort* or *Tame-poiſon* (z), whoſe root is ſuppoſed to be a powerful antidote to poiſons: it has a ſhort upright ſtalk, ovate leaves bearded at the baſe, white flowers growing in proliferous umbels (*a*), and each of them ſucceeded by two long, jointed follicles, incloſing ſeveral compreſſed ſeeds, crowned with a ſoft white down. This is a native of the ſouthern countries of Europe, and is very hardy. Other ſpecies are much larger, growing to the height of ſix or ſeven feet. Some creep very much at the root, and become trouble-

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(y) Cinchona officinalis *Linnæi.*

(z) Aſclepias Vincetoxicum *Lin.*

(*a*) That is, the large umbels have ſmaller ones iſſuing from them.

ſome in a garden. Others coming from the Cape, or the warm parts of America, require care and heat to preſerve them. Some have white, others purple, orange or red corols. Some have the leaves oppoſite, others have them alternate; in ſome again they are flat, whilſt others have their edges rolled back. Many of the ſorts are very handſome. They all agree in the following circumſtances, which therefore form the generic character—that the ſegments of the corol are bent back; that five ovate, hollow nectaries, ending at bottom in a ſharp ſpur, involve the ſtamens and piſtils; and that each flower is ſucceeded by two follicles, incloſing many downy ſeeds.

Stapelia is ſo remarkable a plant of this tribe, that I muſt not omit mentioning it. This has a very large wheel-ſhaped corol, divided beyond the middle into five ſegments, which are broad, flat and ſharp-pointed. The nectary is a double ſtar, one of them ſurrounding, the other covering the ſtamens and piſtils. Two follicles, incloſing many flat, downy ſeeds, follow each flower.

There are only three known ſpecies, all growing naturally at the Cape of Good Hope; and all having ſucculent branches, as thick at leaſt as a man's finger. The three ſorts are diſtinguiſhed by the indentures on the ſides of theſe leafleſs branches; which in the firſt (*b*) ſpread open horizontally, ending in acute points; in the ſecond (*c*) have their points erect; and in the third (*d*) are obtuſe.

In the firſt ſpecies the flowers come out ſingly on a ſhort peduncle from the ſide of the branches towards the bottom: the corol is greeniſh on the outſide, but yellow within, having a purple circle round the nectaries, and the whole is finely ſpotted with purple, like a frog's belly. The branches of the ſecond ſort are much larger, and ſtand more erect; they have four longitudinal furrows, and the indentures are on the ridges between them. The flowers are much bigger than thoſe of the laſt, of a thicker ſubſtance, and covered with fine purpliſh hairs; the ground of it is a greeniſh yellow, ſtreaked and chequered with purpliſh lines.

But the great ſingularity of theſe plants is, that the flower when fully open has a fetid ſmell ſo perfectly reſembling that of carrion, that the common fleſh fly depoſits her eggs in it, which frequently are hatched into little worms, but never proceed any farther, or become flies. A rare inſtance this, of an animal miſtaking its inſtinct.

(*b*) Stapelia variegata *Lin.*
(*c*) Stapelia hirſuta *Lin.*
(*d*) Stapelia mammillaris *Lin.*

Having by this time ſufficiently fatigued you, I leave you, dear Couſin, to meditate on this irregularity in the operations of nature, and once more heartily bid you adieu.

LETTER XVII.

May the 1ſt, 1775.

I AM not ſurpriſed, dear Couſin, at your being ſollicitous to know what the Nectary is, which I mentioned ſeveral times in my laſt. But I am not diſpoſed at preſent to ſatisfy your curioſity any farther, than to inform you, that it is an appendage to the corol, and that there is a juice in it, probably of uſe to the plant, certainly ſerving for the food of bees, and numberleſs other inſects. It is a perfect Proteus, and puts on a far greater variety of forms than the ſon of Neptune. Another time I may perhaps enter more deeply into this matter; but at preſent we will go ſtraight on our way.

You will have great pleaſure when I inform you, that the ſecond Order of the fifth Claſs (*d*) is almoſt wholly made up of the *Umbellate* tribe of plants (*e*), which you are already ſo well acquainted with: there are however a few, which the circumſtances of having five ſtamens and two piſtils, bring into the ſame diviſion of the arbitrary ſyſtem, though they are not naturally related to them. A few of theſe we will examine,

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(*d*) Pentandria Digynia *Lin.*
(*e*) See Letter V.

before we enter into a detail of the *Umbellate* tribe.

Many of them have incomplete flowers, or are deficient in the corol; and may be found among the *Oleraceous* plants in the natural orders of Linnæus, by other authors called *Apetalous*.

Such are all the *Gooſefoots*, of which there are no leſs than eighteen ſpecies, moſt of them growing common on dunghills and in waſte places, and having no beauty to attract your notice. They are known by their five-leaved, five-cornered calyx, incloſing one round, flattiſh ſeed, ſhaped like a lens. One of the moſt reſpectable ſpecies is the *Engliſh Mercury* or *Allgood* (*f*), growing frequent in waſte places, and by walls and way ſides; and cultivated in ſome places as a ſubſtitute to Spinach. The leaves of this are triangular, quite entire, waving, and having the under ſurface covered with a kind of meal, ſeeming gritty to the touch: the flowers grow in compound ſpikes, which are deſtitute of leaves, and ſpring from the *alæ*.

Beet is very nearly allied to theſe in its characters; but it is diſtinguiſhed by having a kidney-ſhaped ſeed, wrapped up in the ſubſtance of the calyx. In its wild ſtate, on

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(*f*) Chenopodium Bonus Henricus *Lin.*

the ſea coaſt, and in ſalt marſhes (*g*), it has two flowers coming out together, the ſtalks are weak and lie moſtly on the ground, the leaves are triangular and oblique or vertical, the diviſions of the calyx are equal and not toothed at bottom, and it flowers the firſt year of its riſing from ſeed. The garden ſort (*h*) has many flowers coming out together, the ſtalks erect, the leaves oblong lance-ſhaped, thick and ſucculent; the diviſions of the calyx are toothed at the baſe, and it does not flower 'till the ſecond year.

It ſometimes has pale green leaves, and ſmall roots; ſometimes dark red or purple leaves, with large, purple roots ſhaped like a carrot: but theſe are not generally ſuppoſed to be diſtinct ſpecies.

The *Glaſſworts* are alſo of this *Oleraceous* tribe. They are diſtinguiſhed by having a large ſeed, ſpiral like a ſcrew, covered with a kind of capſule which is wrapped up in the calyx. There is one ſort that grows wild in the ſalt marſhes (*i*), which has a herbaceous ſtalk that lies on the ground; awl-ſhaped, rough leaves terminating in ſpines; the calyxes edged and ſitting cloſe in the *alæ*; and a trifid ſtyle.

Another ſort which grows wild in warmer

(*g*) Beta maritima *Linnæi.*
(*h*) Beta vulgaris *Lin.*
(*i*) Salſola Kali *Lin.*

countries (*k*), has alſo herbaceous ſpreading ſtems; but it is a much larger plant than the other, and the leaves have no ſpines. Theſe or any of the ſorts yield the cauſtic alkaline ſalt, which is ſo neceſſary in that moſt elegant and uſeful manufacture of glaſs, but this is the ſort generally uſed.

The *Globe Amaranth* (*l*) is of this claſs and order. Its fine round head is compoſed of many flowers, which have a large, boat-ſhaped, flat, coloured calyx, of two leaves; a corol divided into five rude, villous ſegments; a cylindric nectary, divided into five parts at top; a ſtyle cut half way into two; and a capſule opening horizontally, and containing one ſeed. India is its native country: the ſtalk is erect and annual; the leaves are lance-ſhaped, as are the branches, and peduncles, which are long, and naked, except that a pair of ſhort leaves grows cloſe under each head of flowers, which always comes out ſingle. The calyx and corol being dry and chaffy, will retain their colour ſeveral years, and hence their name of *Amaranth* or *incorruptible*. Bright purple is the uſual colour, but ſometimes the heads are brilliant white, or ſilver-coloured. The name muſt not lead you to ſuppoſe this, any more than the *creſted Amaranth*, to be of the

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(*k*) Salſola Soda *Lin.*
(*l*) Gomphrena globoſa *Lin.*

ſame kind with the true *Amaranth* (*m*). When you are told that the *Elm* is of the ſame claſs and order, and alſo one of the incomplete tribe, as having no corol, you will probably reflect that an artificial ſyſtem is very different from a natural arrangement: and in this you are not miſtaken; but then you muſt conſider, that an artificial ſyſtem is the only one that can enable you to find out the genera and ſpecies of plants, which is the art I propoſe to inſtruct you in. Few perſons know that the Elm has any flower, becauſe it is inconſiderable in ſize and appearance, and comes out in an early inclement ſeaſon: however this tree in reality abounds in flowers, before the leaves make their appearance. They have no corol, but a quinquefid calyx: the flower quickly paſſes, and is ſucceeded by one ſeed covered and ſurrounded by a flat membrane. The different ſorts, known by the names of *Rough Witch Elm*, *Smooth-leaved Witch Elm*, *Witch Hazel*, *Engliſh Elm*, *Dutch Elm*, *Upright Elm*, &c. are ſuppoſed to be varieties of one ſpecies (*n*); and all have doubly-ſerrated leaves, unequal at the baſe.

The *Gentians* are alſo of this claſs and order, and of that ſub-diviſion which has monopetalous inferior corols. They are

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(*m*) See Letter XXVIII.

(*n*) Ulmus campeſtris *Lin.*

diſtinguiſhed from the other genera of this ſubdiviſion, by the capſule, which is oblong, round and ſharp-pointed; has one cell, and opens by two valves; having within two receptacles, each adhering lengthwiſe to one of the valves. The form of the fruit is conſtant; whereas the figure and number of parts in the flower vary in the different ſpecies, which are numerous (*o*). Great part of the ſkill and ſagacity of the Botaniſt conſiſts in ſeizing thoſe parts which are conſtant in all the ſpecies, for the generic characters, and in this conſiſts the great merit of Linnæus; writers before him having either taken all parts indiſcriminately, or elſe the ſame part invariably for this purpoſe.

The ſpecies have either four or five petals, and the latter have either funnel-ſhaped corols, or elſe approaching to bell-ſhaped; hence a threefold diviſion of the genus.

The principal of the genus is the *Great Yellow Gentian* (*p*), which has a ſingle ſtalk, three feet high, covered with leaves, that are large, ovate, marked underneath with nerves meeting at the tip; the lower ones petiolate, the upper ſeſſile. There is but one flower to a peduncle, but they grow round the ſtalk in whorls: the calyx reſembles a double ſpathe: the corol is rotate,

(*o*) Thirty-two.

(*p*) Gentiana lutea *Lin.*

cut into five ſegments (*q*); the colour yellow irregularly dotted. The root is very large, and remarkably bitter; it communicates the bitterneſs ſo much to the whole plant, that it remains always untouched by the cattle in the mountainous paſtures of Germany and Swiſſerland, where it grows naturally.

The *Leſſer Centaury* (*r*) is of this genus, and is diſtinguiſhed by its dichotomous ſtalk, and its funnel-ſhaped corols divided into five ſegments: they are of a bright purple colour, but often fade to white. This plant is annual, and varies much in height according to the ſoil, from three or four inches to a foot. This is extremely bitter, as well as the other.

There are ſeveral beautiful little Gentians, with flowers of the fineſt blue that can be imagined, growing wild in the Alps. One of them is frequently cultivated in gardens, under the name of *Gentianella* (*s*), and is ſingular for having its fine bell-ſhaped azure flowers larger than the whole plant beſides.

Yellow Centaury (*t*) is alſo naturally of this genus: it is eaſily known by its upright ſmooth ſtalk, its perfoliate, gray, ſmooth

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(*q*) Varying ſometimes as far as eight.

(*r*) Gentiana Centaurium *Lin.*

(*s*) Gentiana Acaulis *Lin.*

(*t*) Chlora perfoliata *Lin.*

leaves, and its yellow corols cut into eight ſegments. This having alſo eight ſtamens, has been removed from the fifth to the eighth claſs; firſt with the title of *Blackſtonia*, and now under that of *Chlora*. It is an annual plant, and not uncommon in ſome chalky ſoils.

But methinks you are languiſhing to be on ground you are better acquainted with. And indeed you are already ſo well verſed in the nature of the umbellate tribe, that I am perſuaded you will find little difficulty in determining the genera and ſpecies. Many of them are very generally known, either for their uſe in medicine or the kitchen, or elſe for their poiſonous qualities. Moſt of thoſe which grow on dry ſoils have roots that have an aromatic pungent ſmell and taſte; whilſt thoſe which grow in moiſt places or in the water, as many of them do, are in a greater or leſs degree poiſonous.

You have long ſince been able to diſtinguiſh true Parſley and Chervil from Fool's-Parſley (*u*). There is another wild plant that grows upon banks and by way-ſides, called *Hemlock-Chervil* (*v*), which has been miſtaken for *Garden-Chervil* (*w*), and has

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(*u*) See Letter V.
(*v*) Scandix Anthriſcus *Lin.*
(*w*) Scandix Cerefolium *Lin.*

produced bad effects, when put into ſoups: it is not however ſo dangerous, becauſe it does not grow wild in gardens, and we muſt go out of our way to poiſon ourſelves: on another account however it is more dangerous, becauſe it is not only of the ſame diviſion, as having partial involucra only, but alſo of the ſame genus; and therefore liable to be miſtaken for the true Chervil, even when in flower, which Fool's-Parſley cannot be. They have both a radiate corol, petals notched at the end, the flowers in the middle often incomplete and producing no ſeed, and the fruits of an oblong ſhape. However, notwithſtanding all this ſimilitude of character, they are eaſily to be diſtinguiſhed both in and out of flower. *Hemlock-Chervil* is a much lower plant; the ſtalks are ſmooth indeed, and the leaves finely cut, but they are hairy, the diviſions much ſmaller and cloſely placed, and the green much deeper than in *Garden-Chervil*; the corols alſo are uniform, the ſeeds ovate, and very rough. *Garden-Chervil* is a tall, genteel, ſmooth plant; the umbels come out on the ſides of the branches, and ſit cloſe to them; and the ſeeds are long, narrow and ſhining. After all, I am perſuaded, that when you have an opportunity of comparing theſe two plants together, as you eaſily may, the gardener furniſhing you with one, and the other being ſo common in a wild ſtate, you will wonder that any perſon ſhould ever have confounded them. Here you ſee we have an inſtance of an umbellate plant, growing on dry land, that is poiſonous; you are not therefore to conclude that all theſe are wholeſome, any more than that every water ſpecies is poiſonous.

We have another inſtance of fatal confuſion, not in two plants of this tribe; but in one of this, with another of a different claſs; namely of the *Creeping Water Parſnep* (*x*), with *Water Creſs* (*y*), which belongs to the Cruciform flowers. You are ſo well miſtreſs of both tribes, that it is impoſſible you ſhould miſtake them when in flower; but this is not the time when Water-Creſſes are eaten, and this plant is ſo different in its flowering ſtate, that I am perſuaded an eater of it would think himſelf impoſed upon, if he were then ſhown it for Water-Creſſes. When they are both young, they are really not unlike; and ſince they frequently grow together, the one may ſometimes be gathered for the other; though I muſt confeſs that I have not met with the miſtake more than twice, and that only in a ſingle piece among a conſiderable quantity: however, the leaves of Water Parſnep are of a light green; the lobes or ſmall leaves compoſing the whole

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(*x*) Sium nodiflorum *Lin.*

(*y*) Siſymbrium Naſturtium *Lin.*

winged or pinnate leaf are longer and narrower, ſerrated on the edges, and pointed at the end; whereas thoſe of Water-Creſſes have a tincture of brown upon them, the lobes are roundiſh, and particularly the odd lobe at the end is very large and blunt, and they are none of them regularly ſerrated, but have only a few indentures on their edges.

The characters by which you will know the Water-Parſnep when in flower are theſe—it has both an univerſal and partial involucrum, the flowers are all fertile, the petals are heart-ſhaped, and the ſeeds are ovate and ſtreaked. This ſpecies is diſtinguiſhed from the others, by its pinnate leaves, and the umbels of flowers ſitting cloſe to the ſtem, in the *alæ*.

Another poiſonous herb of great fame is the *Hemlock* (z). A tall plant, three feet high and more, eaſily known by its purple-ſpotted ſtalk. It has both the involucra, the univerſal of three, four, five or ſeven broadiſh reflexed leaves; the partial of three or four broad leaves only, on one ſide of the umbel; both very ſhort. The flowers are all fertile; irregular without, regular within: the petals heart-ſhaped. The fruit is almoſt ſpherical, marked with five notched ridges. The common ſpecies is diſtinguiſhed by its ſmooth, ſtreaked ſeeds. The leaves are large, abundant, of a dark green but ſhining, triply pinnate, with the laſt diviſions obtuſely indented; it has many umbels of white flowers, with numerous ſpreading rays. It grows wild on ditch banks, in ſhady lanes, about dunghills and church-yards: and is a biennial plant.

(z) Conium maculatum *Lin.*

The waters afford other poiſonous herbs, as *Water-Hemlock* (*a*), *Long-leaved Water-Hemlock* (*b*), *Hemlock Water-Dropwort* (*c*), and *Common Water Dropwort* (*d*): but let us quit theſe ill-omened plants, and proceed to others more innocent, and more within your reach.

Two umbellate plants you will be ſure to find under every hedge, called *Wild Chervil* (*e*) and *Rough Chervil* (*f*); they are both of the ſame genus, but of a different genus from Garden Chervil. They have partial, but no univerſal involucra; theſe are of five leaves, concave and bent back; ſome flowers in the middle drop without leaving ſeeds; the petals are bent in and heart-ſhaped; and the fruit is oblong and ſmooth. The firſt, vulgarly called *Cow-weed* or *Cow-*

(*a*) Phellandrium aquaticum *Lin.*
(*b*) Cicuta viroſa *Lin.*
(*c*) Oenanthe crocata *Lin.*
(*d*) Oenanthe fiſtuloſa *Lin.*
(*e*) Chærophyllum ſylveſtre *Lin.*
(*f*) Chærophyllum temulum *Lin.*

Parſley, has a ſmooth ſtreaked ſtalk, and the joints ſwelling but a little. The ſecond has a rough ſtalk, and the joints more tumid. The firſt is remarkably leafy, and the leaves very large, and generally ſmooth, except the nerves. The ſecond has hairy leaves, not ſo large, nor ſo much divided; the umbels uſually nod, and the ſeeds are deeply ſtreaked. Both ſometimes have a leaf at the origin of the univerſal umbel: both have a ſtrong ſmell, and approach in their qualities to the forementioned plants, but not enough to denominate them poiſonous.

Some of this tribe are ſo generally uſed in food, that they are univerſally known, and therefore it ſeems impertinent to ſay any thing to you about them; and yet you may have eaten the roots of Carrots and Parſneps, the ſtalks of Angelica, Celeri and Finochia, the leaves of Parſley, Fennel and Sampire, the ſeeds of Coriander and Carraways, without knowing one of the plants when they are preſented to you. However, when you meet with any of theſe in flower, you aſcribe them immediately to the umbellate tribe. Carrot, Sampire and Angelica range among thoſe which have both involucra; Coriander has a partial involucrum only; and the reſt have neither one nor the other. *Carrot* (*g*) has

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(*g*) Daucus Carota *Lin.* In the cultivated ſort all the flowers are fertile.

has a large winged involucrum: ſome flowers in the middle drop without ſeed, and the fruit is ſtiff with briſtles. The outer flowers are very irregular: and the whole umbel as it approaches a ſtate of maturity takes a hollow form, very like a bird's neſt. The leaves are rough and hairy. The garden Carrot differs little from the wild one, but in the ſize and tenderneſs of the root.

Sampire (*h*) has the umbel not flat, or hollow like the laſt, but hemiſpherical, the flowers all alike and fertile, the petals flat, the fruit ovate, flatted. The ſtalks are ſucculent, the leaves pinnate, compoſed of three or five diviſions, each of which has three or five ſmall, thick, lance-ſhaped leaves; the corols are yellow. This herb ſtrikes its roots deep into the crevices of the rocks, and hangs down; growing chiefly in places difficult of acceſs, the herb-gatherers are tempted to ſubſtitute another plant (*i*), which they obtain without trouble on the beach, but which has none of the warm, aromatic quality of the Sampire. Thoſe who live on the Eaſt coaſt muſt wonder what is meant by calling the occupation of a Sampire-gatherer, *dangerous trade*, when they obtain it walking at their eaſe on the

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(*h*) Crithmum maritimum *Lin.*

(*i*) Inula crithmoides *Lin.* Golden Sampire.

flat ſandy ſhore. But theirs is a roundiſh, jointed, taſteleſs ſtalk, with a tough ſtring running through the middle of it (*k*), inſtead of a flat leaf, with a pungent taſte. This Marſh Sampire ranges in the firſt order of the firſt claſs, and is burnt to make Kelp for the glaſs-works. Here you ſee what confuſion of names we have again, and how difficult it muſt be to obtain the plant you want, without knowing ſomething more of it than the name. It is generally true of objects much in requeſt, that where people have them not, they ſubſtitute others, to which they give the ſame title, whether they have the ſame qualities or no: by which if they do not injure themſelves or their neighbours; they at leaſt miſlead the incautious and unexperienced naturaliſts.

Angelica has large globoſe umbels, all the flowers in them are regular and fertile, the petals are inflexed, or bent upwards at the end; the fruit is roundiſh, cornered, or furrowed, and terminated with two reflexed ſtyles.

The cultivated (*l*) and wild (*m*) Angelica are allowed on all hands to be diſtinct ſpecies. They have both pinnate leaves; but the firſt has the odd lobe at the end divided

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(*k*) Salicornia europœa *Lin.* Marſh Sampire, called alſo jointed Glaſſwort or Saltwort.

(*l*) Angelica Archangelica *Lin.*

(*m*) Angelica ſylveſtris *Lin.*

generally into three parts: the ſecond has all the lobes equal, lance-ſhaped, and ſerrated about the edges. The firſt is a much larger plant in all reſpects, the lobes of the leaves broader, rather ovate than lance-ſhaped, and the corols greeniſh: the ſecond, has a thinner and leſs ſucculent ſtem, ſcarcely any univerſal involucrum, and the corols tinged with red.

Coriander has no proper univerſal involucrum, though there is ſometimes one leaf, as in the Wild Angelica; the partial one conſiſts of three leaves, and is ſhort. The flowers in the middle produce no ſeed; the petals are bent inwards, and heart-ſhaped, the outer ones large. The fruit is ſpherical, as you know. The calyx of each little flower is more evident in this, than in the other umbellate plants. The diviſions of the leaves next the ground are broad; thoſe of the upper ones narrow: they and the whole plant are ſmooth, and have a ſtrong rank ſmell, like bugs (*n*).

Parſnep (*o*) has all the flowers fertile and regular, the petals entire and bent inwards; the fruit oblong, flatted, and ſurrounded with a membrane. The leaves are ſimply pinnate. The garden Parſnep differs not ſpecifically from the wild, which has hairy

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(*n*) Coriandrum ſativum *Lin.*
(*o*) Paſtinaca ſativa *Lin.*

leaves, whereas thoſe of the firſt are ſmooth; but ſmoothneſs is a common effect of culture. The cultivated plant is alſo of courſe much larger, and the roots ſucculent and eſculent. Both have yellow corols.

Fennel (*p*) has likewiſe all the flowers fertile and regular; and the petals entire and bent inwards, as in the laſt: the fruit is nearly ovate, flatted, and ſtreaked. *Dill* (*q*), which is alſo of this genus, has the fruit ſurrounded with a membrane, and more flatted than that of Fennel. *Sweet Fennel* is but a variety of the common ſort, though the lobes of the leaves are longer, more ſlender, and not ſo denſe as in that; the ſeeds are longer and much ſweeter. *Finochia* is probably another variety, though a much humbler plant, ſwelling much in breadth and thickneſs juſt above the ground. The leaves of all theſe are very finely cut.

Carraway (*r*) has no proper involucrum, but a ſingle leaf at the origin of the univerſal umbel; the middle flowers fall without ſeed; the petals are keeled, bent inwards, and notched at the end; the ſeeds are of an oblong ovate form and ſtreaked.

Parſley (*ſ*) and *Smallage* (*t*), or *Celeri*, are of

(*p*) Anethum Foeniculum *Lin.*
(*q*) Anethum graveolens *Lin.*
(*r*) Carum Carui *Lin.*
(*ſ*) Apium Petroſelinum *Lin.*
(*t*) Apium graveolens *Lin.*

the ſame genus. They have a ſort of involucrum, generally of one leaf; all the flowers fertile; the petals equal, and bent inwards; the fruit ſmall, ovate and ſtreaked. They have both winged leaves, with the lobes linear on the ſtalk in Parſley, wedge-ſhaped in Smallage, of which Celeri is only an improvement from warmer countries. Our Wild Smallage however, which is common by ditches and brooks, cannot be rendered eſculent by culture.

Earth-nut or *Pig-nut* (*u*), whoſe roots are like a ſmall potatoe and eatable, has both involucra, the leſſer ones narrow as a hair; the flowers in a cloſe umbel, all fertile; the corols regular, with heart-ſhaped petals; and the fruit ovate. It grows, not uncommonly, wild on dry paſtures.

Ferula (*v*), in the dry ſtalk of which Prometheus brought fire from heaven, has both involucra; all the flowers fertile, the petals heart-ſhaped; the fruit oval, flat, and marked with three ſtreaks on each ſide. It is ſo lofty and large a plant as to have acquired the name of *Fennel-Giant*; the lower leaves ſpread two feet, and are ſubdivided into very long, narrow, ſimple lobes; the ſtalk is hollow, jointed, and will grow ten or twelve feet high: when theſe are dry, they have a

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(*u*) Bunium Bulbocaſtanum *Lin.*

(*v*) Ferula communis *Lin.*

light dry pith, which readily takes fire; and the people of Sicily uſe it as tinder. It is a ſpecies of Ferula that produces the *Aſſa fœtida* (*w*).

Cow-Parſnep (*x*) is a very large plant, though not ſo gigantic as the laſt. It has two involucra, but as they are very apt to drop off, you may eaſily be deceived in that reſpect. The corol is very irregular, bent in, and notched. The fruit is ovate, notched, flatted, ſtreaked, and with a membrane round the edge. In moſt of the ſpecies, the middle flowers fall ſeedleſs; but in our common one all the flowers are fertile: the leaves are winged, and the lobes pinnatifid. This plant grows common in meadows and paſtures.

Shepherd's-needle or *Venus's Comb* (*y*) is remarkable for long proceſſes or beaks terminating the ſeeds, and giving it the appearance of a Geranium, when in fruit. It is of the ſame genus with Chervil, and is a common weed among corn. But of theſe umbellate plants enough.

Of the third Order of this fifth claſs we have ſeveral trees and ſhrubs; as the Varniſh-trees and Sumach, Wayfaring-trees and Lauruſtinus, Caſſines, Elder, Bladder-nut, &c.

(*w*) Ferula Aſſa fœtida *Lin.*

(*x*) Heracleum Sphondylium *Lin.*

(*y*) Scandix Pecten *Lin.*

The firſt are known by their inferior flowers, their five-leaved calyx, their corol of five petals, and their berry with one ſeed in it.

Virginian Sumach (z) is common among your ſhrubs, and known to you by the young branches being covered with a velvet-like down, reſembling both in colour and texture a ſtag's horn when firſt budding; the branches are crooked and deformed; the leaves are winged, with ſix or ſeven pair of lance-ſhaped lobes, ſharply ſerrated, and nappy beneath. The flowers are produced in cloſe tufts at the ends of the branches, and are followed by ſeeds incloſed in purple, woolly, ſucculent covers, which give them their autumnal hue, when the leaves fade firſt to purple and then to feuillemort colour.

Wayfaring-tree (*a*), *Marſh-Elder* (*b*), and *Lauruſtinus* (*c*), are all of one genus: having ſuperior flowers, a five-leaved calyx, a corol divided into five ſegments, and a berry incloſing one ſeed.

The firſt has heart-ſhaped leaves very much veined, ſerrated about the edges, and white underneath. The ſecond has lobate leaves, with glands upon the petioles; the flowers round the outſide of the *cyme* are barren, with the corols much larger than the others. The *Gelder-Roſe* is a remarkable variety of this, with the flowers growing in a ball, and every one of them barren. The third has the leaves ovate, and entire, with the veins underneath villous: this is an ever-green.

(z) Rhus typhina *Lin.*
(*a*) Viburnum Lantana *Lin.*
(*b*) Viburnum Opulus *Lin.*
(*c*) Viburnum Tinus *Lin.*

The fourth Order is a very ſmall one, compriſing only two genera: of which *Parnaſſia* is one. This grows wild in wet meadows, and on the borders of marſhes, but not very common. It is eaſily known by its calyx divided into five parts; its corol of five petals; five heart-ſhaped nectaries, furniſhed with hairs, upon the top of which are little balls; a large ovate germ, without any ſtyle; but four ſtigmas; and a capſule of one cell and four valves. It has a ſingle ſtalk, with one heart-ſhaped leaf on it, embracing the ſtalk, and one flower only; the corol is white.

Of the fifth Order, *Pentagynia*, is *Thrift*, *Flax*, &c. *Thrift* (*d*) has the calyx of one leaf, entire, plaited and dry, like chaff (*e*); a corol of five petals; and one ſeed crowned with the calyx. Theſe are the characters of the genus, which has 18 ſpecies. Common Thrift has a threefold involucrum or common calyx, and the flowers growing in

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(*d*) Statice Armeria *Lin.*

(*e*) Scarioſe.

a round head, upon the top of a naked ſtalk; the leaves, which form a cloſe tuft near the ground, are linear. The corols are red, of different ſhades, from pale fleſh colour to a bright ſcarlet; varieties occaſioned by ſoil and ſituation; for this plant is found both on ſalt marſhes and mountains. Thrift was much uſed formerly for edging the borders in flower gardens, but it is now almoſt entirely out of date.

Flax has alſo a corol of five petals; but the calyx is five-leaved, and the capſule opens by five valves, having ten cells within, in each of which is one ſeed. There are no leſs than 22 ſpecies of Flax: that whoſe uſe is ſo extenſive *(f)* is diſtinguiſhed from the reſt by the calyx and capſule being pointed, the petals being notched, the leaves lance-ſhaped, and alternate upon the ſtem, and the ſtalk unbranched. On the top of this are four or five flowers, with beautiful blue corols, very apt to fall off. It is an annual plant; about a foot and a half in height, in the fields. In the garden it will grow ſix inches higher, and branch a little where it ſtands detached.

Both the uſe and beauty of Flax will intereſt you; ſo I leave you with this impreſſion, and bid you once more adieu.

(f) Linum uſitatiſſimum *Lin.*

LETTER XVIII.

May the 15th, 1775.

WE are returned, dear Couſin, to the point from which we firſt ſet out (*g*); the Liliaceous tribe of plants being included in the firſt order of the ſixth claſs, in the Syſtem of Linnæus. Theſe ſuperb and beautiful flowers have gained ſo much on the eſteem of the curious in Europe, that they have ſpared neither trouble in fetching them from the fartheſt parts of the Eaſt, nor expence in cultivating them at home. Hence they are ſo generally known, that perſons not at all verſed in Botany readily find them to be of the ſame family. You certainly are at no loſs to determine their general relation and analogy, from the hints which were thrown out in the firſt letter, and the experience you have ſince acquired. It remains therefore only to be acquainted with their generic and ſpecific characters; to which end I ſhall preſent you with ſome that may be moſt within your reach: were I to ſet every Liliaceous Plant before you whoſe beauty merits your attention, I ſhould almoſt exhauſt the tribe. Two cautions you are to obſerve: firſt, that the whole Liliaceous

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(*g*) See Letter the firſt.

ceous tribe is not confined to the claſs *Hexandria* (*h*), though the far greater part of it is; ſecondly, that other plants, few indeed in number (*i*), are to be found in the ſame order.

You remember that the Lily had no calyx; you are not however to ſuppoſe that the whole tribe is deſtitute of this important part of the flower. It is a circumſtance that occaſions a threefold ſubdiviſion of the order, into ſuch as have a calyx; ſuch as have a ſpathe or ſheath, covering the corol whilſt a bud, but torn and forſaken by the corol when it is expanded; and laſtly, ſuch as have the corol quite naked.

You would not perhaps have ſuſpected at firſt ſight that the *Ananas* or *Pine-Apple* is of this tribe. It is almoſt the only genus capable of miſleading you. The flower has a trifid, ſuperior calyx, a corol of three petals, a ſcale faſtened to the baſe of each petal; the fruit is a ſort of berry. The ſpecies (*k*) is diſtinguiſhed by its long, narrow, pointed leaves, like thoſe of Aloes, ſerrated on the edges, and ſet with tender ſpines; and by the fruit being terminated with a buſh of leaves, commonly called the crown, which being planted takes root, and pro-

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(*h*) See Letter XIV.

(*i*) Eighteen genera out of 65. The whole Claſs has 81 genera and 473 ſpecies.

(*k*) Bromelia Ananas *Linnæi.*

duces another fruit. There are differences in the fruit, proper to be remarked by thoſe who cultivate this luxury; but they are no more than varieties of the ſame ſpecies, and therefore do not concern us as Botaniſts.

Tradeſcantia or *Virginian Spiderwort* (*l*) is another of the Liliaceous tribe furniſhed with a calyx, which in this is three-leaved; the corol alſo has three petals, and the capſule has three cells. It is remarkable for having the filaments fringed with purple jointed hairs. The ſpecies common in gardens is diſtinguiſhed from ſeven others, by its ſmooth, erect ſtalk, and by the flowers growing in cluſters at the top of it. Theſe are of a fine purple, and blow in ſucceſſion moſt part of the ſummer, though each flower continues open but a day. From the number of parts in the fructification, and its enſiform leaves, this plant will range in the ſame natural order with *Iris* and its congeners (*m*).

Of thoſe which have a *Spathe* or *Sheath* inſtead of a calyx, there is the modeſt, the humble, the early *Snow-drop* (*n*); that comes one of the firſt of the year to ſalute us, and, no leſs white than the ſnow itſelf, is frequently covered by it. This is diſtinguiſhed

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(*l*) Tradeſcantia Virginica *Lin.*

(*m*) Called *Enſatæ* by Linnæus. See Letter XIV.

(*n*) Galanthus nivalis *Lin.*

by its ſuperior corol of ſix petals, of which the inner ones are ſhorter by half than the others, and notched at the end. More needs not to be ſaid of a flower ſo univerſally known.

Narciſſus is another of this diviſion. There are many ſpecies, all united by theſe characters: a ſuperior corol of ſix equal petals, and a funnel-ſhaped nectary, of one piece, within which are the ſtamens. The moſt known ſpecies, are the *common white Narciſſus* (*o*) the *Daffodil* (*p*), the *Polyanthus Narciſſus* (*q*), and the *Jonquil* (*r*). The firſt and ſecond, in a natural ſtate, have only one flower burſting from the ſame ſheath; the third and fourth have ſeveral: the firſt has the nectary or cup in the middle of the flower, wheel-ſhaped, very ſhort, chaffy, and a little notched at the edge: the ſecond has a large, erect, curled, bell-ſhaped cup (*s*), ſometimes as long as the ovate petals of the corol: the third has a bell-ſhaped, plaited cup, truncate at the end, and one third of the length of the petals; this has flat leaves, whereas the fourth has them ſubulate, long, and narrow like a ruſh; this alſo has a ſhort

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(*o*) Narciſſus poeticus *Lin.*

(*p*) Narciſſus Pſeudonarciſſus *Lin.*

(*q*) Narciſſus Tazetta *Lin.*

(*r*) Narciſſus Jonquilla *Lin.*

(*s*) Daffodillies fill their cups with tears—Daffodils that come before the ſwallow dares, and take the winds of March.

bell-ſhaped cup. The eſteem in which theſe flowers have been always held, is the occaſion that a great number of beautiful varieties have been produced from the plain ſimple parents. The Dutch catalogues have no leſs than thirty varieties of *Polyanthus Narciſſus*: and in the other three the cup is entirely changed into petals by culture. The petals of the firſt are white, and the cup yellow: the petals of the ſecond are naturally pale brimſtone, and the cup yellow: the petals of the third are either white or yellow, with orange-coloured cups: and the fourth is all yellow.

There is no genus of plants in the whole round of vegetable nature, more ſuperb and beautiful in its flowers than the *Amaryllis*: known by its ſuperior, bell-ſhaped corol of ſix petals; its ſtamens of unequal length; and its trifid ſtigma. Beſides ſeveral other ſpecies, either leſs obvious, or leſs beautiful, you will find here the *Jacobea Lily* (*t*), which produces but one, or at moſt two of its large, deep-red flowers, from the ſame ſheath; the three under petals are larger than the others, and with the ſtamens and piſtil are bent downwards: the whole flower ſtands nodding on one ſide of the ſtalk, and makes a moſt beautiful appearance, eſpecially in the

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(*t*) Amaryllis formoſiſſima *Lin.*

the ſun, when it appears to be powdered with gold duſt.

The *Mexican Lily* (*u*) has ſeveral flowers, generally from two to four, burſting from the ſame *ſpathe*; the corol is bell-ſhaped and regular, the three outer petals are reverſed or reflexed at the tip, the three inner ones are ciliate at the baſe; the ſtamens and piſtil are bent downwards. The flowers are large, of a bright copper colour, inclining to red; and the ſtyle is red, which is unuſual: the baſe of the corol is of a whitiſh green.

The *Guernſey Lily* (*v*) has alſo many flowers in the ſame ſheath, the corols revolute, or rolled back, and the ſtamen and piſtil upright. The corols are of the richeſt red colour, powdered with gold. This fine flower is ſuppoſed to have come originally from Japan.

The Tulip and ſome others which I ſhall now preſent to you, agree with the Lily in having naked, unprotected corols (*w*). The *Tulip* (*x*), unbounded in the variety of colour, in the cultivated ſtate of its gaudy

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(*u*) Amaryllis Belladonna *Lin.*

(*v*) Amaryllis ſarnienſis *Lin.*

(*w*) Linnæus has ſplit the Liliaceous tribe, in his Natural Orders, into the *Enſatæ* before-mentioned; the *Spathaceæ* juſt gone through; and the *Coronariæ* into which we now enter. Some alſo of his *Sarmentaceæ* belong to this tribe.

(*x*) Tulipa Geſneriana *Lin.*

flowers, has an inferior bell-ſhaped corol of ſix petals; and no ſtyle, but only a triangular ſtigma, ſitting cloſe to a long, priſmatic germ. The ſpecies is diſtinguiſhed by its ſhort lance-ſhaped leaves, and its upright flowers, from the *Italian Tulip (y)*, whoſe flowers nod a little, have longer and narrower lance-ſhaped leaves, yellow corols never varying in colour, ending in acute points, and having a ſweet ſcent. The common colour of the Eaſtern Tulip, in a ſtate of nature, is red. This when broken into ſtripes by culture, has obtained the imaginary value of a hundred ducats for a ſingle root, among the Dutch Floriſts.

How different is the ſweet, the elegantly-modeſt *Lily of the valley* (z), from the flaunting beauty of the Tulip! The pure, bell-ſhaped corol, is divided at top into ſix ſegments, which are bent back a little: and the ſeed-veſſel is not a capſule, as in moſt of this claſs, but a berry, divided however into three cells, in each of which is lodged one ſeed: this berry, before it ripens, is ſpotted. I doubt not but that you have often ſearched for it in vain, becauſe this plant ſeldom produces its fruit: the reaſon is, that it runs very much at the root, and increaſes ſo much

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(y) Tulipa ſylveſtris *Lin.*

(z) Convallaria majalis *Lin.* This is one of the *Sarmentaceæ* in the Natural Orders.

that way, as almoſt entirely to forget the other. I have ſeen large tracts covered with it, in the remote receſſes of woods, without a ſingle berry; and the way to obtain them, is to impriſon the plant within the narrow circuit of a pot, when by preventing it from running at the root, it will take to increaſing by the red berry. This ſpecies is diſtinguiſhed from *Solomon's-ſeal*, and others of the genus, by the flowers growing on a *ſcape* or naked ſtalk; it has only two leaves, which take their riſe immediately from the root.

The *Hyacinth* is one of the moſt favoured plants of the Floriſts. In the natural ſtate, wherein you ſeldom ſee it, the corol is ſingle, and cut into ſix ſegments; and there are three pores or glands, at the top of the germ, exuding honey. The ſpecies from whence all the fine varieties take their riſe (*a*), has the corols funnel-ſhaped, divided half way into ſix ſegments, and ſwelling out at bottom. This muſt not be confounded with the *Wild Hyacinth* or *Blue-bells* of the European woods (*b*), which has longer, narrower flowers, not ſwelling at bottom, but rolled back at their tips; the bunch of flowers is alſo longer, and the top of it bends downwards. This is frequently found with white corols.

(*a*) Hyacinthus orientalis *Lin.*

(*b*) Hyacinthus non ſcriptus *Lin.*

Aloe is a remarkable, beautiful and numerous genus, diſtinguiſhed by its erect corols, with a ſpreading mouth, divided into ſix ſegments, and exuding a nectareous juice at bottom: the filaments are inſerted into the receptacle. Linnæus reduces them to ſeven ſpecies, but there are many very diſtinct varieties, if not ſpecies, under each. They have all thick, ſucculent leaves, and the ſpecies may be ſeparated either by the forms of theſe, or by the forms and manner of growth of the flowers.

If you ſhould hear of the *Great American Aloe* (*c*) flowering any where in your neighbourhood, you will find that it differs from the Aloes properly ſo called, by the corol being ſuperior, or ſitting on the top of the germ, and the filaments being longer than the corol. In the firſt circumſtance this differs from almoſt all the liliaceous tribe, which have the germ incloſed within the corol. I ſhould advertiſe you, that you muſt mount a ladder or ſcaffold to examine the flowers, for they grow on a ſtem that is ſometimes twenty feet in height. You know it is a vulgar error that this plant flowers once only in a hundred years; the truth is, that in its own country it flowers in a few years from its birth; but in our cold inhoſpitable climes, it takes many years to produce

(*c*) Agave Americana *Lin.*

its vaſt ſtem and numerous flowers, but the term of its life with us is uncertain; after having flowered, it produces a number of off-ſets, and dies. This is not the caſe in the Aloes properly ſo called, and in them the flowering ſtem is produced from the ſide of the heart or central leaves, whereas in this it iſſues from the very centre, where you obſerve that the leaves lie very cloſe over each other before they expand.

Of Plants not liliaceous belonging to this firſt order of the ſixth claſs, there is one ſhrub, the *Barberry*, and ſeveral plants, deficient in the corol, as the *Calamus Aromaticus* or *Sweet Ruſh* (*d*), the *Rattan* (*e*), and all the ſpecies of *Ruſh* (*f*).

The *Rice* (*g*) is almoſt the only plant to be found in the ſecond order of this claſs. It has the exact form and ſtructure of the Graſſes, differing from them only in the number of ſtamens.

In the third order is the *Dock*, a numerous and prolific genus, containing 31 ſpecies. It is known by the calyx of three leaves, the corol of three connivent petals, and one triangular ſeed. Theſe plants will not attract you by their beauty. Their

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(*d*) Acorus Calamus *Lin.*

(*e*) Calamus Rotang *Lin.*

(*f*) Juncus *Lin.* See Letter XIII. at the end.

(*g*) Oryza ſativa *Lin.*

flowers are more numerous than conſiderable. *Bloody Dock* (*h*) has the valves of the flowers quite entire, one of them bearing a ſeed, and the leaves are lance-ſhaped and hollowed next the petiole. *Curled Dock* (*i*) has the valves entire and graniferous; the leaves lance-ſhaped, waving about the edges, and ſharp-pointed at the end. *Fiddle-Dock* (*k*) has the valves notched about the edges, one of them uſually graniferous, and the leaves next the ground ſhaped like the body of a violin. The great *Water Dock* (*l*) has the valves entire and graniferous, the leaves lance-ſhaped and ſharp-pointed. The common *Blunt Dock* (*m*) has the valves notched and graniferous; the leaves oblong, hollowed at the baſe, near which they are notched, and obtuſe at the end. Common *Sharp Dock* (*n*) has the valves like the laſt; the leaves alſo oblong and hollowed at the baſe, but drawn out into a long point. Two common ſpecies differ in one remarkable circumſtance from all the reſt; for they have the ſtaminiferous and piſtilliferous flowers on ſeparate plants, and therefore ſtrictly belong to the twenty-ſecond claſs;

(*h*) Rumex ſanguineus *Lin.*
(*i*) Rumex criſpus *Lin.*
(*k*) Rumex pulcher *Lin.*
(*l*) Rumex Hydrolapathum *Hudſ.*
(*m*) Rumex obtuſus *Lin.*
(*n*) Rumex acutus *Lin.*

but they are evidently, as you will confeſs upon examination, of the ſame natural genus with the Docks. Theſe are the *Common* (*o*) and *Sheep's Sorrel* (*p*), the firſt growing in meadows and paſtures, the ſecond on dry ſandy grounds; the firſt with oblong, arrow-head leaves; the ſecond with leaves ſhaped like the head of a halberd. Thus you have the means of diſtinguiſhing eight ſpecies of Dock.

Meadow-Saffron (*q*) is alſo of this order, and clearly of the liliaceous tribe; its reſemblance to Crocus or Saffron is obvious. Like that it has a *Spathe* for a calyx; a corol divided into ſix parts, with the tube extending down to the bulb; and a trilobate capſule, of three valves and three cells. So that were it not that the one has three ſtamens with one ſtyle, and the other ſix ſtamens with three ſtyles, they would be of the ſame genus. Meadow-Saffron has flat, lance-ſhaped, erect leaves, and flowers of a light purple; the firſt coming out in the ſpring, the latter in the autumn.

Of the laſt order of this ſixth claſs are the *Water Plantains*, eaſily known by the calyx of three leaves, the corol of three petals, ſucceeded by ſeveral compreſſed capſules,

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(*o*) Rumex Acetoſa *Lin.*
(*p*) Rumex Acetoſella *Lin.*
(*q*) Colchicum autumnale *Lin.*

each containing one ſeed. *Great Water Plantain* (*r*) is common enough in wet places, and on the banks of rivers and brooks : it is diſtinguiſhed from its fellows by its ovate ſharp-pointed leaves and its obtuſely triangular fruits. This is one of the plants in which you cannot err; if the differences of all were ſo ſtrongly marked, your trouble would be diminiſhed, but then your genius and ſagacity, dear Couſin, would not have ſo much room for exerciſe.

(*r*) Aliſma Plantago *Lin.*

LETTER XIX.

June the 1ſt, 1775.

NATURE ſeems to have no delight in the number ſeven; the ſeventh being the ſmalleſt of all the claſſes; containing no more than ſeven genera, and ten ſpecies. Of theſe I ſhall ſelect only one for your obſervation, which ſhall be the *Horſe-Cheſnut* (*s*). It is of the firſt order, and theſe are the principal characters of the genus—a ſmall calyx, of one leaf, ſlightly divided at top into five ſegments, and ſwelling at the baſe; a corol of five petals, inſerted into the calyx, and unequally coloured; a capſule of three cells, in one or two of which only is a ſeed. Linnæus ſays that though no more than one ſeed generally comes to perfection, yet there are two in the young capſule. But ſurely the third cell is not made for nothing; and therefore I ſhould ſuſpect that in Aſia, the native clime of this fine tree, the capſule contains three nuts. The form of the *Horſe-Cheſnut* is grand, the pyramids of flowers beautiful, and making, with the large digitate leaves, a fine whole.

The eighth claſs has forty-four genera, and two hundred and ſeventy-three ſpecies.

(*s*) Æſculus Hippocaſtanum *Lin.*

Indian Naſturtium or *Indian Creſs* (*t*) is one of theſe: the calyx is inferior, of one leaf cut into five ſegments, and terminated by a ſpur; the corol has five unequal petals, and is ſucceeded by three dry berries, in each of which is one ſeed. The greater ſpecies (*u*) is moſt common in the gardens, and is known by the leaves being divided at the edge into five lobes, and being peltate, or having the petiole faſtened to the middle of the leaf's ſurface; the petals are blunt at the end in this; whereas in the ſmaller ſort (*v*) the petals are ſharp-pointed. The corols of both are large, and of a fine orange colour.

Tree Primroſe, a Virginian plant, now ſo common in the European gardens, has a calyx of one leaf cut into four ſegments, a corol of four petals, and a cylindric capſule of four cells, containing naked ſeeds. The broad-leaved ſort (*w*), which is moſt common, has flat, lance-ſhaped leaves, and a hairy ſtalk; the corol is of a fine yellow, ſhut during the day, but expanding in the evening; whence ſome call it *Nightly Primroſe*.

Our European *Willow-herbs* are nearly allied to this, differing only in having a calyx of four leaves, and downy ſeeds. There

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(*t*) Tropæolum *Lin.*
(*u*) Tropæolum majus *Lin.*
(*v*) Tropæolum minus *Lin.*
(*w*) Oenothera biennis *Lin.*

is one ſort common in old gardens called *French Willow* (*x*), with narrow lance-ſhaped leaves inclining to linear, irregularly ſet upon the ſtalk; irregular flowers, and ſtamens bent down. The hairy ſort (*y*) growing common in wet places, by ditches, hedges and ſtreams, and vulgarly known by the names of *Codlins and Cream*, or *Gooſeberry Fool*, from the ſmell of the leaves when ſlightly bruiſed; has lance-ſhaped leaves, ſerrate about the edges, running down the ſtalk, the lower ones oppoſite: the ſtamens of this and of all our common ſpecies are upright, and the petals bifid. Four of the filaments are ſhort, and the other four riſe to the top of the tube of the corol, each four forming a regular ſquare. I don't know whether it is generally ſo, but this year I could ſcarcely find any but what had been gnawn by inſects; ſo that if I had not known the plant well, I ſhould have been puzzled to determine even the claſs. The flowers are large, ſpecious, and of a purple colour.

The Heath genus contains no leſs than 74 ſpecies of lowly ſhrubs, which are by no means deſtitute of beauty, though the commonneſs of one ſpecies renders it contempt-

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(*x*) Epilobium anguſtifolium *Lin.*

(*y*) Epilobium hirſutum *Lin.* ramoſum *Hudſ.*

ible (z). They all agree in theſe characters: a calyx of four leaves, incloſing the germ; a corol of one petal, cut into four ſegments; the filaments inſerted into the receptacle; the anthers bifid; and a capſule of four cells.

Common Heath (a) which is ſo general a plant, that vaſt tracts of land take their names from it, is diſtinguiſhed by the anthers being terminated with an awn, and lying within the flower, the ſtyle appearing beyond it, the corols bell-ſhaped and not quite regular, the calyxes double, the leaves oppoſite and ſhaped like the head of an arrow. *Fine-leaved Heath* (b) has creſted anthers lying within the corol; the ſtyle hardly iſſues from it; the ſtigma is capitate; the flowers grow many cloſe together; the corols are ovate and of a bluiſh colour; the leaves are produced in threes; and the bark is aſh-coloured. *Croſs-leaved Heath* (c) has the anthers as in the firſt; the ſtyle lies within the corol; the flowers grow in a head; the corols are ovate; and the leaves are produced in fours: this grows in the wet and boggy parts of heaths, and is a handſome ſpecies. The foreign ſorts, not being commonly met with, I ſhall not trouble you with them.

(z) E'en the wild Heath diſplays its purple dies.

(a) Erica vulgaris *Lin.*

(b) Erica cinerea *Lin.*

(c) Erica Tetralix *Lin.*

Mezereon, which you value for viſiting you at a time when you have very few viſitors, and alſo for its pleaſant odour, is of this claſs, and of the firſt order, as well as all the foregoing. It has no calyx, but a monopetalous, funnel-ſhaped corol, incloſing the ſtamens, and the border cut into four ſegments: the fruit is a roundiſh berry containing one ſeed. This ſpecies (*d*) is diſtinguiſhed from the reſt of the *Daphne* genus by its ſeſſile flowers, growing by threes from the ſame joint; and by its lance-ſhaped deciduous leaves. The corols are peach-coloured, deeper red, or white, and the berries of the two firſt are red, of the laſt yellow.

There is a ſort (*e*) not uncommonly wild in woods, and ſhady hedges, which is an evergreen, and has the flowers coming out by fives, from the *alæ*; the corols are of a yellowiſh green, and the leaves are lance-ſhaped. This is rather a diſmal plant in reſpect of its ſituation, time of flowering, and colour of the corols; nor has it the ſame agreeable ſcent with the Mezereon: it is not however without its value, as an evergreen, and flouriſhing under the deep ſhade of trees. Both ſpecies are very hot and cauſtic

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(*d*) Daphne Mezereum *Lin.*

(*e*) Daphne Laureola *Lin.* Spurge Laurel.

in their nature; notwithſtanding which, birds are greedy of the berries.

Yellow perfoliate Gentian (f) is now removed from the other Gentians, to the ſecond order of this claſs, becauſe the number eight prevails in the ſtamens, calyx, and corol: in other circumſtances it agrees with the genus in which it formerly ranged. It is found in paſtures, on a chalky ſoil, and is eaſily known by its yellow corols and perfoliate ſtalks.

The third Order has a large genus containing twenty-ſeven ſpecies, among which, beſides other common Plants, are *Biſtort*, *Knot-graſs*, *Buck-wheat* and *Black Bindweed.*

Biſtort (*g*) has a ſingle, undivided ſtalk, terminated by one ſpike of flowers; and lance-ſhaped leaves, generally hollowed at the baſe, running along the petiole, or forming a membrane along each ſide of it, and waved. The root is large for the ſize of the plant, and turns and twiſts in the ground.

Knotgraſs (*h*) is a very common weed in places that are trod. The little flowers are produced from the *alæ* of the ſtalks, which are herbaceous, and trail upon the ground; the leaves are lance-ſhaped, and being of

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(*f*) Chlora perfoliata *Lin.*

(*g*) Polygonum Biſtorta *Lin.*

(*h*) Polygonum aviculare *Lin.*

different ſize and breadth in different ſoils, have given occaſion to the forming diſtinctions, which are but varieties.

Buck-wheat (*i*), which makes a pretty appearance when cultivated, has heart arrow-ſhaped leaves, the ſtalk upright though weak, ſmooth and unarmed, and the angles of the ſeeds equal.

Black Bindweed (*k*) is not very unlike this; but the leaves are heart-ſhaped, the ſtalk angular and twining, and the flowers obtuſe. The anthers alſo are purple; and the baſe of the petioles is perforated beneath with a pore. This is not an unfrequent weed among corn.

All the ſpecies agree in having no calyx, a corol divided into five ſegments, that might eaſily be taken for a calyx; and one naked, angular ſeed.

The ninth Claſs is not more numerous in the genera than the ſeventh, but has many more ſpecies (*l*); and among them ſeveral very remarkable ones, as the Bay, Cinnamon, Caſſia, Camphor, Benzoin and Saſſafras, all comprehended under one genus (*m*); Acajou or Caſhew Nut, and Rhubarb. The Bay genus has the following character: no calyx, but a corol reſembling a calyx, and

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(*i*) Polygonum Fagopyrum *Lin.*

(*k*) Polygonum Convolvulus *Lin.*

(*l*) Twenty-eight: and only 6 genera.

(*m*) Laurus.

divided into ſix parts in moſt of the ſpecies; a nectary of three glands, each terminated by two briſtles, ſurrounding the germ; the filaments in three rows, with two round glands near the baſe of the three that form the inner row; the fruit an oval *drupe* or plum, incloſing a nut.

The True Bay (*n*) is known by its lance-ſhaped, veiny, evergreen leaves; the corol recedes from the general character, in being quadrifid, or cut into four ſegments. It varies alſo in the number of ſtamens from 8 to 14; and it recedes from the claſs, in having incomplete flowers on ſeparate plants. Linnæus however has kept it here, becauſe it has the eſſential characters of this genus, particularly the glands on the inner filaments. You will ſcarcely have the good fortune to meet with the other ſpecies, at leaſt in flower.

Acajou or *Caſhew* (*o*) we know chiefly by the nut, which grows at the end of a fleſhy body, as large as an Orange, and full of an acid juice; this Linnæus calls the receptacle. Between the two ſhells is a thick, black inflammable oil, with which you may mark your linnen, for it will not waſh out. It alſo makes the fineſt black varniſh. I

(*n*) Laurus nobilis. Laurel is known only to modern times, and ranges in the Claſs *Icoſandria* under *Prunus*. Alexandrian Laurel is a Ruſcus in Claſs XXII.

(*o*) Anacardium occidentale *Lin*.

need not caution you againſt putting this nut into your mouth to crack it. The oil is very cauſtic, and will raiſe bliſters in the tongue. If it ſhould ever be your fortune to ſee this tree in flower, you will obſerve that the calyx is divided into five parts; that the corol conſiſts of five reflexed petals; and that there are 10 filaments, whence Linnæus firſt put it into the tenth claſs; but one of theſe being conſtantly without an anther, he afterwards removed it to the ninth.

Theſe are of the firſt Order, *Rhubarb* is of the ſecond, *Trigynia*; there being no plants known of this claſs with two piſtils. The characters of this genus are, a flower without a calyx; a corol of one petal, divided into ſix ſegments; and one large triangular ſeed, much like that of the Docks *(p)*. No leſs than four ſpecies have been ſent over and cultivated at different times under a notion of their being the true Tartarian Rhubarb. Of theſe the *Rhapontick* (*q*) has migrated from the Apothecary's ſhop into the Kitchen, the petioles of the leaves being much eſteemed for making of tarts. The leaves are ſmooth, of a roundiſh heart-ſhape, with the petioles thick, reddiſh, a little channelled on their lower part, but

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(p) They are both placed in the ſame natural Order, namely the fifth diviſion of the *Oleraceæ*.

(*q*) Rheum Rhaponticum *Lin.*

flat at the top: the flower-ſtems are purple, grow from two to three feet high, and are terminated by thick, cloſe, obtuſe ſpikes of white flowers, coming out in June. This grows wild near the Pontic, Euxine or Black Sea.

There is good teſtimony for the three others being the true Rhubarb; and I think it not improbable but that they may all be cultivated in Tartary for their roots. One of theſe (*r*) has longer leaves than the Rhapontick, running more to a point, much waved on their edges, a little hairy on their upper ſide, and they appear much earlier; the petioles are not ſo much channelled on their under ſide and are plain on the upper; they are alſo neither ſo red nor ſo thick: the flower-ſtem is of a pale browniſh colour, about four feet high, dividing into ſeveral looſe panicles of white flowers, which appear in May.

Another (*s*) has very ſmooth, ſhining, heart-ſhaped leaves, not running out ſo much to a point as the ſecond, but more than the firſt; they are very broad towards the baſe, and a little waved and indented on their edges: the petioles have ſcarcely any channels, and are flat on their upper ſide; they are pale green, and almoſt

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(*r*) Rheum Rhabarbarum *Lin.*

(*s*) Rheum compactum *Lin.*

as large as thoſe of the firſt ſort. The flower-ſtem is pale green, five or ſix feet high, the upper part dividing into ſmall branches, each ſuſtaining a panicle of white flowers ſtanding erect, and appearing the latter end of May.

A fourth ſort, called *Palmated Rhubarb* (*t*), differs greatly from the others, and is known immediately by its palmated and very ſharp-pointed leaves. The flower-ſtem is red, and ſix or ſeven feet high; the flowers are in looſe panicles. Whatſoever may be the caſe with the other ſpecies, there is the moſt undoubted evidence of this being the true Tartarian Rhubarb.

There is one wild plant of this Claſs, which is of the third Order, having ſix ſtyles. It grows in the water, and having handſome roſe-coloured flowers, with long narrow leaves, is called *Flowering Ruſh* (*u*); the flowers are produced at the end of a naked ſtalk, in an umbel. They have no calyx, but a three-leaved involucrum, a corol of ſix petals, and ſix capſules of one valve, gaping on the ſide towards the centre of the umbel, and containing many ſeeds.

The tenth is a much more conſiderable Claſs, having 95 genera, and 536 ſpecies. The firſt Order being very numerous, Linnæus has made a commodious ſubdiviſion of it

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(*t*) Rheum palmatum *Lin.*

(*u*) Butomus umbellatus *Lin.*

into ſuch as have corols of many petals, of one petal, or none; and the firſt of them he has ſubdivided again into ſuch as have irregular, and ſuch as have equal corols. Moſt of thoſe with irregular polypetalous flowers are very nearly allied to the Papilionaceous tribe, with which you are already acquainted. Of theſe the moſt known are the *Judas-tree*, *Locuſt-tree*, *Flower-fence*, *Braſiletto*, all the numerous ſpecies of *Caſſia*, *Balſam of Tolu-tree*, and *Nickar Tree*; moſtly the produce of South America and the Weſt Indies. *White Dittany* or *Fraxinella* is alſo of this ſubdiviſion, but not of the Papilionaceous tribe.

This elegant flower is known by its five-leaved calyx; its corol of five ſpreading petals; the filaments ſet with glandulous points: it is ſucceeded by five connected capſules, containing two ſeeds covered with a common *aril*.

There is only one ſpecies of *Fraxinella*, varying in the colour of the flowers, which are either pale red ſtriped with purple, or elſe white. It has pinnate leaves, ſomewhat reſembling thoſe of the Aſh. The whole plant emits an odour of lemon peel, but when bruiſed has a balſamic ſcent.

Among the plants with regular or equal polypetalous corols, you will find *Logwood*, *Melia* or the *Bead-tree*, *Guaiacum*, *Rue*, and *Dionæa Muſcipula*, ſo curious for that ſenſi-

tive

tive quality of the leaves, by which it entraps inſects that light upon them.

Rue is diſtinguiſhed by theſe generic characters: a calyx divided into five parts; concave petals; ten honied pores at the baſe of the germ, which is raiſed on a receptacle punched with the ſame number of pores; and laſtly, a capſule cut half way into five parts, conſiſting of five cells within, and containing many ſeeds. If I do not give you a caution reſpecting the common Rue (*v*) of the gardens, you may probably be puzzled in examining its flowers; for there is only one flower on a branch which will anſwer to the generic characters; in all the reſt you are to ſubtract one fifth from every part of the fructification. This circumſtance is not peculiar to Rue, but is found in ſeveral other plants (*w*), and has been made an objection by ſome to the Linnæan Syſtem. The illuſtrious Author has extricated himſelf from the difficulty, by forming his character upon the principal or primary flower, as he calls it, and announcing the anomaly. There are other plants, which in all the reſt, *add* a fifth to the number of parts in the primary flower (*x*).

(*v*) Ruta graveolens *Lin.*

(*w*) As in Cinchona, Myrſine, Euonymus europæus, Theſium alpinum, Herniaria fruticoſa, Gentianæ 23—27. Linum Radiola, &c.

(*x*) Such as *Adoxa Moſchatellina*, and ſome others.

Garden Rue is ſpecifically diſtinguiſhed, partly by this circumſtance, of having the ſide flowers quadrifid, and partly by the leaves being decompounded. There are ſome differences in this ſpecies: common Garden Rue has the component lobes of the leaves wedge-ſhaped, and the ſtamens longer than the corol; another, alſo frequently cultivated, has narrower lobes, the flowers in longer, looſer bunches, and the ſtamens equal in length with the petals, the ſeed-veſſel is alſo ſmaller; a third has the lobes of a linear ſhape.

Andromedas, *Rhododendrons*, *Kalmias*, *Arbutus*, and a few others, have regular monopetalous corols. The characters of the laſt are, a very ſmall calyx divided into five parts: an ovate corol pellucid at the baſe: and the fruit a berry, with the ſeeds lodged in five cells.

Strawberry-tree (*y*) is known by its woody ſtem, its ſmooth leaves ſerrate about the edges, and the cells of the berries having ſeveral ſeeds. Some of the other ſpecies have weak procumbent ſtems (*z*); and ſome have only a ſimple ſeed to each cell (*a*). You are well acquainted with the Arbutus, by the ornament which it affords to your plan-

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(*y*) Arbutus Unedo *Lin.*

(*z*) Arb. acadienſis, alpina & uva urſi.

(*a*) A. alpina & uva urſi.

tations in the latter months, with its lucid leaves thick covering the plant; and its bunches of flowers of this year, accompanied by the red round berries of the laſt.

But let not the firſt order of the tenth Claſs occupy too much of your time, ſince there are four other orders contained in it. In the ſecond you have all the *Saxifrages,* forty-two in number; agreeing in a calyx divided into five parts; a corol of five petals; a capſule of one cell, filled with many ſmall ſeeds, and terminated by two beaks formed of the perſiſtent ſtyles. Of theſe, *Pyramidal Saxifrage* (*b*) is eſteemed, for adorning halls and chimnies, with its beautiful pyramids of white flowers; which it will do for a long time. There are ſeveral varieties of it, but they have all ſtiff tongue-ſhaped leaves, with a cartilaginous ſerrate border, and collected into ſeveral rows cloſe to the ground. From the midſt of theſe iſſues the ſtalk, ſuſtaining the panicles of flowers.

Another ſpecies (*c*) was alſo formerly much ſhown out at windows and balconies in ſmoaky towns, and hence with its being really beautiful, had the names of *London Pride* and *None-ſo-pretty,* at a time when few plants were generally known. This has

(*b*) Saxifraga Cotyledon *Lin.*
(*c*) Saxifraga punctata *Lin.*

oblong or roundiſh leaves deeply notched on the edges, ſpringing from broad, flat, furrowed petioles, near two inches long. They ſurround the flowering ſtalk, which itſelf is deſtitute of leaves, of a red colour, ſtiff, ſlender, and hairy. The corols are white dotted with red.

Common White Saxifrage (*d*) flowers early and in great quantities among the graſs. The bottom leaves are kidney-ſhaped, hairy, and on pretty long petioles; the ſtalks are hairy, and in good ground a foot high, branching out from the bottom, and furniſhed with a few ſmall leaves, in ſhape like the others, but ſitting cloſe to the ſtem: the flowers terminate the ſtalk in ſmall cluſters; the corols are white, and large for the ſize of the plant: if any doubt remains concerning it, pull it up, and you will find that the roots are like grains of corn, and of a reddiſh colour. In poor ground this plant is very ſmall, and has only two or three flowers, ſometimes but one, on a ſimple, unbranched ſtem.

Theſe, with moſt of the other ſpecies, have upright ſtems, but there are three which have weak trailing ſtalks. Of theſe there is one which has much reſemblance to a moſs, when it is out of flower; and from the manner of its growth in a thick tuft, it

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(*d*) Saxifraga granulata *Lin.*

has acquired the Engliſh name of *Ladies Cuſhion* (*e*). The leaves are linear, ſome entire and others trifid: the little flower-ſtems are three or four inches high, ſlender, erect, and almoſt naked, terminated by ſmall flowers of a dirty white.

The genus *Dianthus*, of this ſecond Order, is numerous, as well as the laſt, compriſing twenty-two ſpecies, which agree in having a cylindric calyx of one leaf, ſurrounded at the baſe by four ſcales; a corol of five petals; and a cylindric, unilocular capſule, for a ſeed-veſſel. Many of the ſpecies are beautiful, as *Sweet William (f)*, the noble *Carnation* (*g*), the *Pink* (*h*) with all its numerous varieties, the *China Pink* (*i*) diſtinct from the former: ſeveral alſo of the ſorts, which are wild in many parts of Europe, though adorned with leſs ſplendid flowers, and more modeſt in their pretenſions, are not however without their beauty. The *Carnation* is acknowledged on all hands for a worthy leader of one of the fineſt Natural Orders, entitled from the Latin name of this fragrant flower *Caryophylleous* plants. When we conſider the ſize of the flower, the beauty of its colours, the arrangement of its parts,

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(*e*) Saxifraga hypnoides *Lin.*
(*f*) Dianthus barbatus *Lin.*
(*g*) Dianthus Caryophyllus *Lin.*
(*h*) Dianthus plumarius *Lin.*
(*i*) Dianthus chinenſis *Lin.*

and above all the ſingularly rich and ſpicy odour that it exhales, we cannot withhold that tribute of admiration which will ever be given it, unleſs by obtruding itſelf too frequently on the eye, its real beauties become at length diſregarded.

The leading feature in diſtinguiſhing the ſpecies of this genus is the *inflorcſcence* or manner of flowering. *Sweet William* and ſome others have aggregate flowers; *Carnation*, *Pink*, *China Pink*, &c. have many flowers on the ſame ſtalk, not however in herds, but ſolitary or ſeparate; ſome few have one flower only on a ſtem; and two or three have ſhrubby ſtalks. The other circumſtances that diſcriminate the ſpecies are, that the ſcales at the baſe of the calyx in the *Sweet William* are of an ovato-ſubulate form, and as long as the tube of the corol; in the *Carnation* and *Pink* they are ſubovate and very ſhort; in the *China Pink* they are ſubulate, as long as the tube, and hang looſe. The *Sweet William* has alſo lance-ſhaped leaves. *Carnation* and *China Pink* have the petals notched. The *Pink* has the corols pubeſcent at the baſe, and the petals deeply cut. For ornament and beauty you will gather theſe flowers from your parterre; but as a Botaniſt you will take them from a wall or a dry untilled ſoil, where their ſimplicity and the clearneſs of their natural characters will make you full amends for the want of

ſplendor,

ſplendor. You would not always chooſe to be among full-dreſſed people at a Ball or in a Drawing-Room; but ſometimes to take a rural walk, and entertain yourſelf with plain country manners.

In the third Order, beſides ſome others, there are four genera containing many ſpecies, which have a good deal of ſimilitude. They are however thus well diſtinguiſhed. *Arenaria* and *Stellaria* have a capſule of one cell; *Cucubalus* and *Silene*, a capſule of three cells: of the two former the firſt has the petals entire, the ſecond has them bifid: of the two latter, in both of which the petals are bifid, the ſecond has a crown compoſed of a ſet of minute petals, in the centre; whereas the firſt has nothing of this, or is naked. *Arenaria* and *Stellaria* have alſo a five-leaved calyx; in *Cucubalus* it is much inflated, and in *Silene* it is ſwelling. All four have five petals in the corol.

Spatling Poppy (*k*) is not an uncommon weed among corn and in meadows. You will know it by the almoſt round and much inflated calyx, beautifully veined, ſo as to have the appearance of a fine network thrown over it, and quite ſmooth; the corols are not entirely naked, and are pure white.

Sedums or *Stone-crops* are found in the

(*k*) Cucubalus Behen *Lin.*

fourth Order *(Pentagynia)*. They are known by the general prevalence of the number five in all parts of the flower: a calyx cut into five ſegments, a corol of five petals, five nectariferous ſcales at the baſe of the germ, and five capſules: not to mention the twice five ſtamens, and five ſtyles, which form the characters of the claſs and order. Many of them are not uncommon in a wild ſtate, particularly a ſmall trailing ſort with yellow flowers growing in a trifid cyme; and ovate, blunt, ſmooth leaves, imbricate and alternately adhering to the ſtalk (*l*): other ſpecies have white, and ſome red corols. They grow chiefly on walls, or in very dry ſoils.

Cockle (*m*), which is ſo common a weed among corn, has a membranaceous, one-leaved calyx; a corol of five obtuſe, undivided petals, and an oblong capſule of one cell. The ſpecies is diſtinguiſhed, by the roughneſs of the plant; the length of the ſegments of the calyx, and by the petals being entire and naked.

Of *Lychnis* there are ſeveral ſpecies agreeing in theſe common characters. An oblong, ſmooth calyx of one leaf; a corol of five petals ſlightly bifid; and a one-celled capſule of five valves.

(*l*) Sedum acre *Lin.* Wall-pepper.

(*m*) Agroſtemma Githago *Lin.*

Scarlet Lychnis (*n*), commonly cultivated in gardens, has the flowers growing in bunches, ſo that the whole forms nearly a flat ſurface at top; the colour of the corol is a very high ſcarlet.

Catchfly (*o*), ſo called from the clammy juice exuding from the ſtalks under each pair of leaves, glutinous enough to entangle ſmall flies, is known by the petals being almoſt entire; the colour of them is red: the leaves are long, narrow, and graſs-like, eſpecially the lower ones. The flowers of this and the foregoing are uſually double in the gardens, and therefore uſeleſs to you in your botanical reſearches.

There is a ſort of *Lychnis* commonly wild by water-ſides and in moiſt meadows, called *Ragged-Robin*, *Meadow-Pinks*, *Wild-Williams* or *Cuckow-flower (p)*, which has red jagged petals, generally cut into four parts; and roundiſh capſules, the mouth of which has five teeth turning back. There is alſo another no leſs common in paſtures, called *White Lychnis* or *White Campion* (*q*), which differs eſſentially from its congeners in having the piſtils ſeparate from the ſtamens, and on diſtinct plants. I leave you, dear Couſin, with this irregularity, and wait a day of leiſure to purſue our botanical career.

(*n*) Lychnis chalcedonica *Lin.*
(*o*) Lychnis Viſcaria *Lin.*
(*p*) Lychnis flos cuculi *Lin.*
(*q*) Lychnis dioica *Lin.*

LETTER XX.

June the 10th, 1775.

NOTHING difficult has hitherto occurred, dear Couſin, in your determination of the Claſſes, the number of the Stamens alone having ſufficed for that purpoſe. But no plant being yet diſcovered with eleven ſtamens, among thoſe which have them diſtinct (*r*), the eleventh Claſs ſhould be expected to contain thoſe plants which have twelve; but here the number is found to be by no means conſtant, and Linnæus is obliged to take into his Claſs *Dodecandria*, all ſuch plants as have from twelve to nineteen ſtamens incluſive. Nor is the eleventh Claſs, with all this latitude, an eaſy one for a novice to determine; the number of ſtamens in ſome caſes being fewer than 12, in others more than 19, or elſe coming out in parcels at different periods. It is not very numerous, containing but thirty-three genera and one hundred and ſixty-four ſpecies.

Of the firſt order, the moſt known or the moſt remarkable are *Aſarum* or *Aſarabacca*, the *Mangoſteen*, *Winter's Bark*, *Purſlain*, *Looſeſtriſe*.

(*r*) *Brownea*, which has naturally eleven ſtamens, is of the ſixteenth Claſs, *Monadelphia*.

Aſarabacca has a calyx cut half way into three ſegments, and ſitting on the top of the ſtyle: no corol: and a leathery capſule, of ſix cells within, and crowned at top. There are three ſpecies—the *Canadian*, the *Virginian*, and the *European* (*s*), which laſt is diſtinguiſhed by two kidney-ſhaped leaves, ending bluntly.

Purſlain has a bifid calyx incloſing the germ: a corol of five petals: and a capſule of one cell, in which the receptacle is looſe; in ſome ſpecies it opens horizontally (*t*), in others it is trivalvular: the number of ſtamens varies in the different ſpecies. The *Purſlain* cultivated for ſallads (*u*), is a native of the hot parts of America; it is known by its wedge-ſhaped leaves, and the flowers ſitting cloſe to the ſtalk; and it is one of thoſe which have the capſule opening horizontally.

Looſeſtrife has the calyx cut at the edge into twelve portions; and incloſing the germ: the corol of ſix petals, inſerted into the calyx: the capſule bilocular, and containing many ſeeds. *Purple Looſeſtrife* (*v*) is a handſome plant, adorning the banks of rivers, ponds and ditches with its fine ſpikes of purple flowers; the leaves grow in pairs,

(*s*) Aſarum europæum *Lin.*

(*t*) Capſula circumſciſſa.

(*u*) Portulaca oberacea *Lin.*

(*v*) Lythrum Salicaria *Lin.*

and are lance-ſhaped with a hollowed baſe; ſometimes three leaves come out together from the ſame point, and the ſtalk is hexangular; but this is only an accidental variety. Our ſpecies anſwers to the character of the Claſs, in having twelve ſtamens; but there are ſome which have but ten, nay even only ſix ſtamens.

In the ſecond Order are only two genera—*Heliocarpus*, an American Plant, little known; and *Agrimony*, an European, and ſufficiently common. This has a ſmall quinquefid calyx, ſitting on the top of the germ, fortified with another: a corol of five petals, inſerted into the calyx, and one or two roundiſh ſeeds in the bottom of the calyx. The number of ſtamens is very uncertain in this genus; ſome ſpecies having 12, others 10, others 7. *Common Agrimony* (*w*), which is found in woods and by hedge-ſides, has interruptedly-pinnate leaves on the ſtalk, with the odd lobe at the end petiolate; the ſeeds are fortified with briſtles. The outer calyx grows faſt to the inner; and the ſtamens vary in number from 12 to 20.

The third Order has alſo only two genera, but they are numerous; *Reſeda* having 12, and *Euphorbia* no leſs than 69 ſpecies. No genera are more difficult to determine than theſe; the number and form of the parts

(*w*) Agrimonia Eupatoria *Lin.*

varying in the different ſpecies. The eſſential character of the firſt conſiſts in the trifid petals, one of them melliferous at the baſe; and in a capſule of one cell never cloſed but always open: the calyx alſo is of one leaf, cut into ſeveral narrow ſegments, two of which gape more than the others, on account of the melliferous petal; the ſtamens are from 11 to 15 in number.

Dyers-weed or *Weld* (*x*) grows common in barren paſtures, dry banks, and on walls; it is alſo cultivated for the uſe of the Dyers (*y*). The leaves are lance-ſhaped, and entire except that they have one indentation on each ſide at the baſe; and the calyx is cut into four ſegments. The corol alſo has three petals; the upper one melliferous, and divided half way into ſix parts; the oppoſite lateral petals are trifid; and ſometimes two ſmall entire petals are added below. *Dyer's-weed* is a biennial plant, producing the firſt year a circle of leaves cloſe to the ground; and the next a ſtalk terminated by a long looſe ſpike of yellowiſh flowers.

Sweet Reſeda or *Mignionette* (*z*) has oblong leaves, ſome of which are entire, and others trifid; the calyx of the flower is large, equalling the corol in ſize. The flowers are pro-

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(*x*) Reſeda Luteola *Lin.*

(*y*) This is thought to be the plant with which the ancient Britons dyed their bodies.

(*z*) Reſeda odorata *Lin.*

duced in looſe ſpikes, on long peduncles; are of an herbaceous colour, and much eſteemed for their agreeable odour, like that of freſh Raſpberries.

Euphorbia has a corol of four, and ſometimes of five petals, glandulous in moſt ſpecies, in ſome ſhaped like a creſcent, or indented about the edges, in a few thin as a fine membrane; commonly placed as it were on the outſide of the calyx, which is of one leaf, divided at the edge into four, or in ſome into five parts, and ventricoſe or ſwelling out. The ſtamens are 12 or more, iſſuing forth at different periods. The ſeed-veſſel is a capſule of three diſtinct cells united, with one roundiſh ſeed in each cell, and on the outſide ſmooth, rough or warted in the different ſpecies. This genus being ſo numerous, ſome ſubordinate diſtinctions are neceſſary: and accordingly Linnæus has divided it into ſeven ſections. The firſt contains the *Euphorbiæ* properly ſo called; or ſuch as have a ſhrubby, angular, ſpiny ſtem, generally void of leaves. The ſecond contains the ſhrubby ſpecies without ſpines. In all the other ſections, the ſtems are *dichotomous* or divide always by pairs, and the flowers are born in a kind of umbel: which in the third ſection is commonly *bifid*; in the fourth *trifid*; in the fifth *quadrifid*; in the ſixth *quinquefid*; and in the ſeventh *multifid*.

Several ſpecies of the firſt ſection yield indifferently that acrid milky juice, which when inſpiſſated is ſent us under the title of *Euphorbium*. The flowers are of little beauty, and theſe plants have been noticed rather for the ſingularity of their form, and the ſtriking difference of their ſtructure from the plants of Europe, than for any charms that they poſſeſs. The ſpecies ſuppoſed to be that from whence the ancients had the drug (*a*), is known by a triangular, jointed ſtalk: the ſpecies from which it is ſaid we now have it (*b*), has a quadrangular ſtem, and double ſpines: and the ſpecies which Linnæus ſuppoſes ought to be uſed (*c*), is multangular with double ſpines.

Meduſa's-head (*d*) is of the ſecond ſection. The ſtalks are cloſely covered with tubercles, lying over each other, and from the ſides of theſe ſpring many branches which, are frequently ſo entwined as to give the idea of a parcel of ſerpents. The ends of the branches have narrow ſucculent leaves readily dropping off, and a ſet of white flowers.

The plants of the other ſections are commonly known by the name of *Spurge*, and are moſt of them wild in the different parts

(*a*) Euphorbia antiquorum *Lin.*

(*b*) Euphorbia canarienſis *Lin.*

(*c*) Euphorbia officinarum *Lin.*

(*d*) Euphorbia Caput Meduſæ *Lin.*

of Europe. Two ſpecies are common weeds in kitchen gardens: one of them (*e*) belongs to the fourth ſection, or thoſe which have trifid umbels; the ſubdiviſions of theſe are dichotomous: the *involucellæ* or *bractes* are ovate; and the leaves are quite entire, or without any notches about the edge; they are ovate in form, and attached to the ſtalk by ſhort petioles; each petal alſo has two little horns: the other (*f*) is of the ſixth ſection, having quinquefid umbels; each principal diviſion ſubdivides into three; the *involucellæ* are ſhaped, as in the former; the leaves are wedge-ſhaped, and ſerrate about the edges; and the petals are round and entire. A third ſpecies (*g*), common in woods, is of the laſt ſection, with multifid umbels: it is a larger plant, and perennial; whereas the others are annual: the *involucellæ* are round and perfoliate; the leaves are very blunt at the end.

Spurges having little beauty, they are ſeldom cultivated in gardens. One of the moſt common is a biennial ſpecies, of the fifth ſection, with the leaves oppoſite and quite entire, called *Broad-leaved Spurge*, or *Cataputia* (*h*). Its native place is Italy and the

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(*e*) Euphorbia Peplus. Petty Spurge.

(*f*) Euphorbia helioſcopia *Lin.* Sun Spurge.

(*g*) Euph. amygdaloides *Lin.* Wood Spurge.

(*h*) Euphorbia Lathyris *Lin.*

South of France: it grows three or four feet high; the flowers are of a greeniſh yellow, and the capſules being very elaſtic, the ſeeds are thrown to a conſiderable diſtance. A ſecond is perennial, and of the laſt ſection (*i*): the *involucellæ* are heart-ſhaped; the petals are formed like a creſcent; and the capſules are ſmooth: ſome of the branches are barren, and others bear flowers and ſeed; on the firſt the leaves are narrow and ſetaceous—on the ſecond they are lance-ſhaped.

There is a genus (*k*) of this Claſs in which the number twelve prevails in all the parts. Having 12 ſtyles it is of the Order *Dodecagynia*. The calyx is divided into 12 parts; the corol conſiſts of 12 petals; and the flower is ſucceeded by 12 capſules, containing many ſmall ſeeds. *Common Houſeleek* (*l*) is one of theſe, which, though ſo ſucculent a plant, flouriſhes on walls and roofs. The edges of the leaves are ſet with ſhort fine hairs; and they do not grow in a globular form, as ſome other ſpecies do, but ſpread open. From the centre of the heads of leaves ariſes a round, red, ſucculent flower-ſtalk, about a foot high, which at bottom has a few narrow leaves,

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(*i*) Euphorbia Cypariſſias *Lin.*

(*k*) Sempervivum, nearly allied to the Sedums in the tenth Claſs.

(*l*) Sempervivum tectorum *Lin.*

leaves, and at top divides into two or three parts, each ſupporting a reflexed range of flowers with red corols. Though the natural number in this genus be twelve; yet you will find it to vary exceedingly: Nature being leſs conſtant in larger than in ſmaller numbers. With this ſhort ſketch, adieu, dear Couſin, for the preſent.

LETTER XXI.

June the 21ſt, 1775.

YOU have already, dear Couſin, taken an imperfect view of the twelfth Claſs, as far as it relates to Fruit Trees (*m*): you are not however to ſuppoſe, either that all theſe trees range in the claſs *Icoſandria*, or that no other but them are to be found there. No leſs than 29 genera and 294 ſpecies are included in this claſs, a conſiderable portion of which is trees or ſhrubs; many herbs however are found among them.

To diſtinguiſh this claſs and the next from the reſt, and from each other, remember always that it is not the number, but the ſituation of the ſtamens which furniſhes the claſſical character. In the next they ariſe, as generally in the other claſſes, from the receptacle; but in this they ſpring either directly, or with the parts of the corol, from the calyx; which is of one leaf, and not flat but hollow: the corol is moſt frequently of five petals.

Of the firſt order, *Cactus* is a very conſiderable genus, compriſing the *Melon-thiſtles*, *Torch-thiſtles* or *Cereuſes*, and the *Opuntias* or *Indian Figs*. Theſe all agree in a calyx,

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(*m*) In Letter VII.

whole at the bottom, but yet conſiſting of ſeveral rows of leaves, and placed on the top of the germ: in a corol which is double, or formed of ſeveral rows of petals: and in having a berry containing ſeveral ſeeds in one cell.

The *Melon-thiſtles* are roundiſh bodies, without either leaf or ſtalk. The *Torch-thiſtles* have a long ſtem without leaves, which in many ſpecies is ſtrong enough to ſupport itſelf; but in ſome trails along the ground, or is ſupported by trees: theſe laſt are called *Creeping Cereuſes. Opuntias* are compoſed of flat joints connected together.

Theſe are all remarkable for a ſtructure different from that of other plants; but ſome of the *Cereuſes* are much eſteemed for the beauty of the flowers, which are perhaps the more noticed, becauſe they are the leſs expected from plants whoſe appearance is ſo unpromiſing. Thoſe of the *great-Flowering Creeping Cereus* (*n*) are near a foot in diameter, the inſide of the calyx of a ſplendid yellow, and the numerous petals of a pure white: hardly any flower makes ſo magnificent an appearance, during the ſhort time of its duration, which is one night only; for it does not begin to open 'till ſeven or eight

(*n*) Cactus grandiflorus *Lin.*

o'clock in the evening, and cloſes before ſunriſe in the morning, unleſs it is gathered and kept in the ſhade, by which means I have prevented it from cloſing 'till about ten. This noble flower opens but once, but when to the grandeur of its appearance, we add the fine perfume which it diffuſes, there is no plant that more deſerves your admiration. When it is not in blow, you will know it, by the creeping ſtem, marked longitudinally with about five prominencies.

Another ſpecies of *Creeping Cereus* (*o*) is more common, but ſcarcely leſs admirable for the beauty of its pink-coloured flowers, which the plant produces in greater quantity; they are alſo of longer duration, for they not only boldly ſhow their face to the ſun, but will even keep open three or four days. When it is not in flower, this ſpecies is diſtinguiſhed by its very ſlender branches, covered with ſpines, and marked with ten prominencies. But you are well acquainted with this fine plant, which requiring little heat, forms one of the principal ornaments of your dreſſing room, in the month of May.

There are many ſpecies of *Opuntia, Indian Fig*, or *Prickly Pear*, all natives of America, and kept rather for their ſingularity than their beauty, having no leaves, but a flat

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(*o*) Cactus flagelliformis *Lin.*

jointed ſtalk, ſet with knots of prickles, briſtles or both. The *Cochineal Fig* *, on which the inſect of that name feeds, is the only one that is unarmed: this has oblong joints; the common ſort † has roundiſh joints, with bruſhes of briſtles, but no prickles.

In this ſame Order you will find the *Syringa* (*p*). The natural number in the calyx, corol and capſule is four; but ſometimes it is five. The taſte of the leaves like cucumbers, and the odour of its white flowers, like thoſe of the orange, ſufficiently diſtinguiſh this well known ſhrub from all others. The ſlight indentations about the edges of the leaf ſeparate it from another ſpecies, which has none.

Here too will you find your favourite *Myrtle*, which has a calyx ſitting on the top of the germ, and generally cut into five ſegments; a corol of five petals; and a berry for a fruit. Some ſpecies however have a quadrifid calyx, and then the corol has four petals: others have an entire undivided calyx. The *Common Myrtle* (*q*), of which there are many varieties, has the flowers coming out ſingly, and an *involucrum* of two leaves upon the peduncle.

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* Cactus cochinillifer *Lin.*

† Cactus Opuntia *Lin.*

(*p*) Philadelphus coronarius *Lin.*

(*q*) Myrtus Communis *Lin.*

In the ſecond Order there is only the *Cratægus*, a genus comprehending ſeveral ſpecies of *Thorn*, and alſo two trees, the *Aria* or *White Beam Tree* (*r*) and the *Maple-leaved Service* (*s*). The generic characters are, a calyx cut into five ſegments, and ſitting on the top of the germ; a corol of five petals; and a berry containing two ſeeds. The firſt of the trees is readily known by the ovate ſhape of the leaves, with very prominent tranſverſe veins, and unequal ſerratures about the edges; but particularly by the hoaryneſs of their under ſurfaces: the ſecond, by its leaves cut into many acute angles like thoſe of the Maple; the diviſions are five or ſeven, and the loweſt lobes ſtand wider than the others. *Cock's-ſpur Hawthorn* (*t*) has the leaves ovate, and ſo deeply ſerrate, as to be almoſt lobate. *Virginian Azarole* (*u*) has oval leaves, wedge-ſhaped at the baſe, ſhining and deeply ſerrate. *Common Hawthorn* or *White-thorn* (*v*), whoſe flower has obtained the name of *May*, from the month in which it appears, has obtuſe leaves, cut into three principal parts, and thoſe ſerrate. *True Azarole* (*w*) has leaves

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(*r*) Cratægus Aria *Lin.*
(*s*) Cratægus torminalis *Lin.*
(*t*) Cratægus coccinea *Lin.*
(*u*) Crat. Cruſ-galli *Lin.*
(*v*) Cr. Oxyacantha *Lin.*
(*w*) Cr. Azarolus *Lin.*

like the foregoing, but larger, paler, and with broad lobes: the flowers and fruit are alſo much larger. All theſe you will find in your plantations: as you will alſo two trees that are in the third Order, under the genus *Sorbus*; viz. the *Mountain Aſh* (*x*) and the *Service* (*y*); which have both pinnate or winged leaves, like the Aſh; ſmooth on both ſides in the firſt, but villous on the under ſurface in the ſecond; theſe alſo have the lobes broader, and not ſo much ſerrated. Their common characters are a quinquefid calyx, a pentapetalous corol, and an inferior berry with three ſeeds.

The fourth Order *(Pentagynia)*, beſides the *Apple*, *Pear* and *Quince*, comprehended under one genus, *Pyrus*; has the *Medlar* with many other ſpecies of trees or ſhrubs in a ſecond (*z*); and all the ſhrubs called *Spiræa*, in a third. Theſe genera agree in a quinquefid calyx, and a pentapetalous corol; the germ is incloſed within the flower in the laſt; but is beneath it in the reſt: the fruit is the principal diſtinction; in *Pyrus* it is a *Pomum*—in *Meſpilus* a *Berry*—in *Spiræa* a ſet of *Capſules*.

This Order boaſts a large and ſplendid genus of herbaceous ſucculent plants, called

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(*x*) Sorbus aucuparia *Lin.*
(*y*) Sorbus domeſtica *Lin.*
(*z*) Meſpilus *Lin.*

Ficoides or *Fig Marigolds* (*a*). Forty-four ſpecies all conſent in a quinquefid calyx on the top of the germ; a multifid corol of narrow linear petals; and a fleſhy capſule divided into cells correſponding with the number of ſtyles, and containing many ſeeds. Though moſt of the ſpecies have five ſtyles; yet ſome have only four, and others have ten. This large genus is ſubdivided into three ſections, from the colour of the flowers, which being ſtriking and permanent, may here very well furniſh ſuch a diſtinction, though it is in moſt caſes a circumſtance not to be depended on. The corols then, which are ſpecious, very large and double, are in the firſt ſection *white*, in the ſecond *red*, and in the third *yellow*. The different forms of the ſucculent leaves afford almoſt of themſelves ſufficient ſpecific diſtinctions.

The moſt known ſpecies is that which is called *Diamond Ficoides*, or more commonly *Ice Plant* *. This has ovate, alternate, waving leaves, with white corols; but it is chiefly regarded for the ſingularity of being covered with pellucid pimples, in the ſun appearing like cryſtalline bubbles. *Egyptian Kali* †, eſteemed for making the

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(*a*) Meſembryanthemum *Lin.*

* Meſembryanthemum cryſtallinum *Lin.*

† Meſemb. nodiflorum *Lin.*

beſt pot-aſh, is alſo of this genus; has alternate, roundiſh, obtuſe leaves, ciliate at the baſe, and white corols.

Of the laſt Order of this Claſs, the *Roſe* is a genus univerſally known; and were it leſs ſo, would hold the firſt rank in the admiration of mankind. The diſtinctive characters are, a quinquefid calyx; a pentapetalous corol; and a kind of pitcher-ſhaped, fleſhy berry, formed out of the calyx, terminated by the diviſions of it, and containing ſeveral oblong, rough ſeeds, growing to the calyx on every ſide. The ſpecies are diſtinguiſhed by the globoſe or ovate form of the fruit, by the ſituation of the ſpines on the different parts of the ſhrub, the infloreſcence, &c. The *Sweet Briar* (*b*) has globoſe fruits beſet with crooked ſpines, and the leaves rubiginous or ruſty underneath. The *Dog-roſe* or *Wild Briar* (*c*) has ovate fruit, but ſmooth, as are alſo the peduncles; the ſtalk however and the petioles are ſpinous, the petals are bluſh coloured and bilobate, and there are two ciliate bractes, oppoſite each other, to every flower.

Strawberry, with all its various fruits, conſtituting only one ſpecies (*d*), is of this Order. Here, though the corol has only

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(*b*) Roſa rubiginoſa *Lin.*

(*c*) Roſa canina *Lin.*

(*d*) Fragaria veſca *Lin.*

five petals, the calyx is cut into ten ſegments, alternately larger and ſmaller, and the ſeeds are diſperſed over the ſurface of a roundiſh, pulpy receptacle, vulgarly called a berry. Theſe are the generic characters. All the eatable Strawberries increaſe by runners; and by this circumſtance they are ſufficiently diſtinguiſhed from the barren ſort (*e*), which not only has a dry juiceleſs receptacle, but never throws out any of theſe runners.

The thirteenth Claſs, *Polyandria*, has many ſtamens to the flowers (*f*), as well as the foregoing, but ſpringing from the receptacle, along with the piſtil. Theſe two Claſſes united would have formed too large a Claſs for commodious examination; a difficulty to be avoided certainly in all caſes where we can: beſides, the plants contained in the one, are in general ſo different, both in their form and qualities, from thoſe of the other, that it would have been a pity to intermix beings ſo diſcordant, or to unite in the ſame Claſs, Fruits which are ſo pleaſant to the palate, and wholeſome to the conſtitution; and Herbs deſtructive to the human frame from their poiſonous qualities; as many of thoſe in the Claſs *Polyandria* are known to be.

(*e*) Fragaria ſterilis *Lin.*

(*f*) From 20 to 1000.

In the firſt Order *(Monogynia)* you will find the *Poppy*, which is ſufficiently diſtinguiſhed by a calyx of two leaves (*g*); a corol of four petals; and a one-celled capſule, crowned with the ſtigma, under which it opens with many holes, to give exit to the numerous little ſeeds. Of this genus, four ſpecies have rough, and five have ſmooth capſules. The common *Corn Poppy* (*h*); the ſpecies uſed in medicine, and which yields the Opium (*i*); the Welch Poppy; and the Oriental ſort, now introduced as an ornament to the flower garden (*k*); are all of the latter diviſion. The firſt has the capſules almoſt globoſe; the ſtalk covered with hairs, and ſuſtaining ſeveral flowers of a fine high ſcarlet; and the leaves pinnatifid and cut. The ſecond has the calyx ſmooth, as well as the capſule, the leaves cut and embracing the ſtalk: that which is cultivated in the fields has white corols, and oblate ſpheroidal heads as big as an orange, with white ſeeds; the garden ſort has purpliſh corols very dark at the baſe, with ſmaller oblong heads and black ſeeds: this varies much in colour, and has ſometimes very large and very double flowers, then reſembling

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(*g*) This falls off ſpontaneouſly when the flower expands.

(*h*) Papaver Rhæas *Lin.*

(*i*) Papaver ſomniferum *Lin.*

(*k*) Papaver orientale *Lin.*

bling an immenſe Carnation. Some perſons are of opinion that the field and garden Poppy are different ſpecies; Linnæus makes them but one: I have given you the differences, but do not take upon me to decide. The capſules of the *Welſh Poppy* are oblong; the ſtalk ſmooth; the leaves winged and cut; the corols large and yellow. The *Oriental Poppy* has rough, leafy ſtalks ſupporting one large, ſingle red flower; the leaves are winged, and ſerrate about the edge. All the ſpecies of Poppy have a ſtrong diſagreeable ſmell.

The *Caper* (*l*) is of this firſt Order; ſo is the *Tea-tree* and the *Lime* (*m*); the *Water-Lilies* both *yellow* (*n*) and *white* (*o*), ſpreading their broad leaves on the ſurface of flow-moving ſtreams and ſtagnant pools, and raiſing their ample many-petal'd corols above it. Here alſo is the numerous and beautiful genus *Ciſtus*, known by a calyx of five leaves; two of which are leſs than the other three; a corol of five petals; and a capſule for a ſeed-veſſel. Of theſe there are forty-nine ſpecies, moſt of them ſhrubs, but ſome herbaceous; the corols purple, white or yellow in the different ſorts.

(*l*) Capparis ſpinoſa *Lin.*
(*m*) Tilia europæa *Lin.*
(*n*) Nymphæa lutea *Lin.*
(*o*) Nymphæa alba *Lin.*

Peony is of the ſecond Order, which is a ſmall one; the characters of the genus are a calyx of five leaves, a corol of five petals, and two or three germs, crowned immediately with ſtigmas, without the interpoſition of any ſtyles.

This, and ſome plants of the following Orders, are ſtrictly united by one natural bond, under the name of *Multiſiliquæ* or *Many-podded*; having a fruit compoſed of ſeveral pericarps joined together. They agree likewiſe in having either no calyx, or at leaſt one very apt to fall off; a polypetalous corol, and ſtamens exceeding the petals in number. Of theſe you are acquainted with the *Larkſpur* and *Aconite*, belonging to the third Order; the *Columbines* to the fifth, and *Hellebore* to the laſt. None of them have any calyx; and they have all a corol of five petals: the nectaries form the principal diſtinction of the genera. This in *Larkſpur* is bifid, ſeſſile, and continued backwards into a horn or ſpur. *Aconite* has two recurved, pedunculate nectaries. *Columbine* has five of theſe horn-ſhaped nectaries, between the petals. *Hellebore* has many ſhort, tubulous nectaries, placed in a ring round the outſide of the ſtamens, each divided into two lips at top. *Larkſpur* has alſo either one capſule or three; and the garden ſpecies (*p*) is diſtinguiſhed by its ſimple unbranched ſtem from the wild one (*q*), which has it ſubdivided: theſe both have the nectary of one leaf; in *Bee-Larkſpur* (*r*) and the reſt it is of two. *Aconite* has the upper petal arched; and three or five capſules. You have one ſpecies common in your flower borders and plantations, with long ſpikes of large blue flowers, called *Monk's-hood* (*s*); this is one of the ſpecies that have three capſules to a flower; and the leaves are multifid, with linear diviſions, broadeſt at top, and marked with a line running along them. *Wholeſome Wolfsbane* (*t*), as it is called, has five capſules, five ſtyles, and the flowers are ſulphur-coloured. *Columbine* has five diſtinct capſules: the common ſort (*u*) has bent nectaries; in its wild ſtate the flowers are blue, the petals ſhort, and the nectaries very prominent; in the garden you obſerve not only a variety of colours, but that the petals are excluded, and the nectaries much multiplied. *Hellebore* has ſometimes more than five petals to the corol; and always ſeveral capſules ſucceeding to each flower; theſe

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(*p*) Delphinium Ajacis *Lin.*
(*q*) Delphinium Conſolida *Lin.*
(*r*) Delphinium elatum *Lin.*
(*s*) Aconitum Napellus *Lin.*
(*t*) Aconitum Anthora *Lin.*
(*u*) Aquilegia vulgaris *Lin.*

contain many round ſeeds, fixed to the ſuture of the capſule. The winter-flowering ſpecies, commonly called *Winter Aconite* (v), is the only one that drops its petals; it bears one yellow flower ſitting on the leaf. *True Black Hellebore*, or *Chriſtmas Roſe* (w), has one or two large white flowers upon a naked ſtalk, and fleſhy pedate leaves. *Stinking Black Hellebore* or *Bear's-foot* x), ſuſtains many greeniſh flowers on one ſtalk, and pedate leaves on the ſtalk, but none towards the root. This is not uncommon wild, and you will find it flowering during winter under the trees in your plantations. Caution your poor neighbours againſt being too free in giving their children this plant againſt worms; for in too large a doſe it is certainly dangerous. Indeed all the herbs juſt now deſcribed are more or leſs poiſonous: *Aconite* is known to be highly ſo.

The laſt Order of this Claſs *Polyandria* contains alſo the *Tulip-Tree*, which has a triphyllous calyx, ſix petals to the corol, and many lance-ſhaped ſeeds lying one over another, and forming a ſort of *ſtrobilus*. This tree is remarkable for the ſhape of its leaves, having the middle lobe of the three truncate, or cut tranſverſely at the end. The flowers are large and bell-ſhaped; the petals marked with green, yellow and red ſpots (*y*). Here alſo are the *Magnolias*, which have a calyx of three leaves like the laſt, but a corol of nine petals; the fruit is a *ſtrobilus* or ſcaly cone of bivalvular çapſules, covering a club-ſhaped receptacle, each capſule containing a roundiſh ſeed, like a berry, hanging out by a thread. It is to be lamented that theſe fine trees, ſo beautiful both in leaf and flower, will not bear all the rigour of our climate.

(v) Helleborus hyemalis *Lin.*
(w) Helleborus niger *Lin.*
(x) Helleborus foetidus *Lin.*

This Order boaſts two numerous genera, much eſteemed among the Floriſts — the *Anemone* and *Ranunculus*. The firſt has no calyx; a corol of two or three rows, with three petals in each row; and many naked ſeeds, retaining each their ſtyle. You are now too far advanced in the ſcience, to need a caution againſt taking the fine flowers of your beds, upon which the gardener ſo much values himſelf, in order to examine the corol of the *Anemone*; they are the children of art, not of nature, which we are ſtudying. The early *Hepatica* (*z*) is of this genus; and is known by its three-lobed entire leaves. It is the only ſpecies which has any thing like a calyx; for it has a *perianth* of three leaves, which being remote from the flower,

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(*y*) Liriodendron Tulipifera *Lin.*

(*z*) Anemone Hepatica *Lin.*

is rather an *involucrum* than a calyx. The *Paſque-flower* (*a*), ſo called from its flowering about Eaſter, is alſo of this genus: it adorns ſome of our dry chalky hills with its beautiful bell-ſhaped, purple flowers; and though it has no calyx, properly ſo called, yet the flower-ſtalk has a leafy multifid *involucrum*; and the leaves are doubly winged or *bipinnate*. Each plant bears but one nodding flower; and after that is paſt, the top of the plant is hoary with the tails, which adhere to the ſeeds. Another wild ſort is the *Wood Anemone* (*b*), bearing only one white or purpliſh flower on a plant; the leaves are compound, with cut lobes; and the ſeeds are pointed, but without tails. The Eaſtern Anemones, which are ſo ornamental to the flower-garden in the ſpring, are only of two ſpecies, notwithſtanding the great variety of their colours; red, white, purple, blue, with all the intermediate ſhades, and innumerable variegations of them. Art, to increaſe their beauty, has rendered them very large and double; but we can ſtill diſtinguiſh the ſpecies by the leaves, which in one (*c*) are decompounded, dividing by threes; in the other (*d*) digitate: the ſtalk is leafy; and the ſeeds are tailed,

(*a*) Anemone Pulſatilla *Lin.*
(*b*) Anemone nemoroſa *Lin.*
(*c*) Anemone coronaria *Lin.*
(*d*) Anemone hortenſis *Lin.*

in both ſpecies. The rival genus of the Anemone is the *Ranunculus*, which differs from it in having a calyx of five leaves, and a corol of five petals: but the diſtinguiſhing mark of this genus is a honied gland juſt above the baſe of each petal, on the inſide. Of forty-four ſpecies many are wild, and ſome extremely common in moſt parts of Europe, under the name of *Butter-flowers*, *Butter-cups* and *King-cups*. Three ſorts particularly, which at one ſeaſon caſt a yellow veil over our meadows, are generally confounded and looked upon as one. However the *bulbous* (*e*) has the calyx bent back to the flower-ſtalk, whereas in the *creeping* (*f*) and *acrid* (*g*) it is open or ſpreading: in the firſt and ſecond the peduncle is furrowed; in the third it is round without any channelling: beſides this, the leaves are very different upon inſpection; and the firſt has a bulbous root, the ſecond throws out abundance of runners which ſtrike root like thoſe of the ſtrawberry, and the third is a taller, genteeler, later-flowering plant. But not the meadows only are filled with *Ranunculi*; the woods (*h*), the corn-fields (*i*), the waters (*k*)

(*e*) Ranunculus bulboſus *Lin.*

(*f*) Ranunculus repens *Lin.*

(*g*) Ranunculus acris *Lin.*

(*h*) Ranunculus auricomus *Lin.*

(*i*) Ranunculus arvenſis *Lin.*

(*k*) Ranunculus ſceleratus, hederaceus, aquatilis, &c. *Lin.*

have alſo their ſhare of them. One ſpecies, which flowers in moiſt meadows very early in the ſpring, is ſo diſtinct from its fellows, that ſome botaniſts have not ſcrupled to remove it from this genus, to form one by itſelf: for it has a calyx of three leaves only; but, to make amends, a corol of more petals than five: it has heart-ſhaped, angular, petiolate leaves, one flower on a ſtalk, and tuberous or knobby roots (*l*). But the *Perſian Ranunculus* (*m*) is the great rival of the Anemone, in the flower-garden, for the beauty and variety of the large, double corols; which are ſo changed by art, that you muſt have recourſe, for the ſpecific diſtinction, to the leaves; theſe are ternate and biternate, the lobes trifid and cut. The ſtalk is erect, round, hairy, and branching at bottom: the radical leaves are ſimple. With all this employment as a Botaniſt, and amuſement as a Floriſt, I leave you, dear Couſin, for the preſent.

(*l*) Ranunculus Ficaria *Lin.* Leſſer Celandine.
(*m*) Ranunculus aſiaticus *Lin.*

LETTER XXII.

July the 1ſt, 1775.

HAVING now finiſhed more than half our courſe, we are arrived at a ſet of natural Claſſes, with which you are ſo well acquainted, as to find no difficulty in aſſigning the proper place to any plant belonging to them.

The ſtructure of the flowers in the fourteenth Claſs was explained at length in my fourth letter: but the proper and eſſential character of it is, the having four ſtamens, all in one row, and in pairs; the inner pair longer than the other, whence the name *Didynamia*; and one ſtyle: all included within an irregular monopetalous or ringent corol.

This Claſs has only two Orders; which are not founded upon the form of the flower, as you might be led to ſuppoſe from what was ſaid in a former letter; nor upon the number of the ſtyles, as in the foregoing Claſſes, becauſe none of the flowers have more than one; but upon the circumſtance of having four naked ſeeds, boſomed in the calyx; or elſe many, fixed to a receptacle in the middle of a pericarp: the firſt of theſe is called *Gymnoſpermia*, the ſecond *Angioſpermia*.

This Claſs contains 102 genera, and 643 ſpecies, and each Order forms a natural one —the firſt including the *Verticillate* plants, ſo called from the manner in which the flowers grow, in *verticilli* or *whorls:* they alſo agree in producing the leaves by pairs, and in having the ſtalks ſquare. The ſecond compriſing the *Perſonate* flowers; or ſuch as have moſtly a perſonate corol, but always a pericarp, or veſſel incloſing the ſeeds.

The eſſential generic character of *Ground Ivy* (*n*), is at the ſame time beautiful and extremely diſtinctive, each pair of anthers forming an elegant little croſs, one above the other. The leaves are kidney-ſhaped, and notched about the edges. In this genus, in Hyſſop, Mint, Lavender, Bugle, Betony, Dead-Nettle, Cat-Mint, Savory, Horehound, &c. the calyxes are pretty regularly quinquefid. In Thyme, Baſil, Self-heal, Marjoram, Baum, &c. they are bilabiate. In *Mint* the corols are hardly ringent; the filaments are ſtraight and diſtant. *Lavender* has the corols as it were turned *topſy-turvy*; that which is the upper part in moſt others being the lower in this, and *vice verſa*; the calyxes alſo are ſupported by a *bracte*; and the ſtamens lie within the tube. *Teucrium* has no proper upper lip, but the corol is ſlit

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(*n*) Glechoma hederacea *Lin.*

quite through for the ſtamens to paſs. *Bugle* has the upper lip of the corol remarkably ſhort, much ſhorter than the filaments; our common wild ſpecies (*o*) is known by its ſmoothneſs, and increaſing by runners. *Betony* has the upper lip of the corol flattiſh and riſing, with a cylindric tube; the ſegments of the calyx are prolonged into narrow thin points like awns; and the filaments extend not beyond the neck or opening of the tube. *Wood Betony (p)* is diſtinguiſhed by an interrupted ſpike, and by the middle ſegment of the lip being emarginate, or having one notch. *Cat-mint* has the middle diviſion of the lower lip crenate or ſlightly notched; the edge of the chaps reflexed; and the ſtamens cloſe. The flowers of the wild ſpecies (*q*) are in a ſpike, conſiſting of a ſet of whorls on ſhort peduncles; the leaves are heart-ſhaped, bluntly ſerrate and petiolate. If you have any doubt concerning this plant, preſent it to puſs, and ſhe will inform you by the careſſes which ſhe beſtows upon it, in common with Marum and Valerian; the firſt of which not growing wild, and the ſecond being ſo very different a plant, ſhe cannot lead you into an error. *Black Horehound* and *White Horehound* have both a ca-

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(*o*) Ajuga reptans *Lin.*
(*p*) Betonica officinalis *Lin.*
(*q*) Nepeta Cataria *Lin.*

lyx marked with ten ſtreaks; but the upper lip of the corol in the former is arched and crenate: in the latter ſtraight, linear and bifid. *Common Black Horehound* (*r*) is known by its whole, heart-ſhaped, ſerrate leaves, and ſharp-pointed calyxes: the corols are red. *Common White Horehound* (*s*) has the diviſions of the calyx ending in ſetaceous hooked points: the corols are white, and the whole plant has a white appearance from the nap that covers the ſtalks and leaves.

Of the ſecond diviſion with bilabiate calyxes, *Thyme* has the opening of the tube cloſed with hairs. *Wild Thyme* (*t*) that ſmells ſo gratefully, and adorns dry ſheep paſtures with its red flowers, is known by theſe flowers growing in a head; by the diviſions of the calyx being ciliate; the leaves ovate, flat, blunt at the end, dotted with little glands, and ciliate at the baſe; and by its creeping ſtalks. *Garden Thyme* (*u*) is an erect plant, with its ovate leaves revolute, and the flowers in a ſet of whorls, all together making a ſpike. Of this there are ſeveral varieties, as there are alſo of the other. *Baſil* has an *involucrum* of many narrow leaves immediately under the whorl of flowers. *Marjoram* is diſtinguiſhed by an *involucrum* com-

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(*r*) Ballota nigra *Lin.*
(*s*) Marrubium album *Lin.*
(*t*) Thymus Serpyllum *Lin.*
(*u*) Thymus vulgaris *Lin.*

compoſed of ovate, coloured, imbricate *bractes*, forming all together a ſquare kind of ſpike or *ſtrobilus*. *Wild Marjoram* (*w*) has the ſpikes rounded at the corners, conglomerate, and all together forming a panicle; the bractes longer than the calyxes. You will find this both wild under hedges, and among buſhes, alſo in the kitchen garden under the name of *Pot Marjoram*. *Sweet Marjoram* (*x*) has ovate leaves, blunt at the end; and roundiſh, compact pubeſcent ſpikes. *Winter Sweet Marjoram (y)* has long, aggregate, pedunculate ſpikes, and the bractes the length of the calyxes. The corols of this are white; of the other red. *Dittany of Crete* (*z*) has the ſmall, purple flowers collected in looſe nodding heads, with imbricate bractes; the ſtalks are pubeſcent, purpliſh, and ſend out ſmall branches from their ſides by pairs; the leaves are round, thick, and ſo woolly as to be quite white: the whole plant has a piercing aromatic ſcent, and biting taſte. This is the celebrated plant with which Venus cured the wound of Æneas (*a*). *Baum* has a dry, chaffy, angular calyx, flattiſh at top; the upper lip riſing: the caſque of the corol is a little arched, and deeply notched or

(*w*) Origanum vulgare *Lin.*

(*x*) Origanum Majorana *Lin.*

(*y*) Origanum heracleoticum *Lin.*

(*z*) Origanum Dictamnus *Lin.*

(*a*) Virgil Æneid. XII.

bifid; the lower lip is trifid, with the middle lobe heart-ſhaped. *Common Garden Baum* (*b*) has the flowers growing in ſmall looſe bunches from the wings of the ſtalk, in whorls, and the pedicles are ſimple or unbranched. There are two plants of this genus growing wild, that have the name of *Calamint* (*c*). *Dracocephalum* is diſtinguiſhed principally by the great inflation, or wide opening of the chaps of the corol: the upper lip alſo is arched, folded and obtuſe. Of this genus is the very fine ſmelling plant vulgarly called *Baum of Gilead* (*d*), which has compound leaves, conſiſting of three or five oblong, pointed, ſerrate lobes; and flowers coming out in thick, ſhort ſpikes; the corols are pale blue. *Self-heal* is known immediately by its forked filaments, with the anthers inſerted below the top: the ſtigma alſo is emarginate or bifid. *Wild Self-heal* (*e*) ſo common in paſtures has all the leaves of an oblong ovate form, ſerrate about the edge, and petiolate. *Scutellaria* is abundantly diſtinct from all the other genera of this Order by its fructification; for the calyx is entire at the mouth, and after the flower is paſt, cloſes with a kind of lid; ſo that the whole bears a reſemblance to a helmet, whence the names of

(*b*) Meliſſa officinalis *Lin.*

(*c*) Meliſſa Calamintha & Nepeta *Lin.*

(*d*) Dracocephalum canarienſe *Lin.*

(*e*) Prunella vulgaris *Lin.*

Caſſida, *Skull-cap*, and *Hooded Willow-herb:* and the ſeeds being hereby incloſed in a kind of capſule, this genus forms the connecting link between this Order and the next. The ſpecies common on the banks of rivers, by ditch ſides, and other watery places *(f)*, has lance-ſhaped leaves, hollowed at the baſe, notched about the edge, and wrinkled on the ſurface; the flowers are blue, and proceed from the *alæ*, or angles formed by the leaves or ſubdiviſions with the main ſtem.

The corols in all the genera of the firſt Order, with very few exceptions, are open-mouthed, *Labiate*, or *Ringent* properly ſo called. In the ſecond Order, which you are now going to ſurvey, many of them are *Perſonate*, or Labiate with the lips cloſed; ſome however have open bell-ſhaped, wheel-ſhaped, or irregular corols. To have ſeeds incloſed in a *Pericarp* is common to all, and hence the name of the Order, *Angioſpermia*. In moſt of the genera the calyxes are quinquefid; in ſome however they are bifid, in one trifid, in many quadrifid, and in two multifid.

Of thoſe with bifid calyxes, you have the *Orobanche* or *Broom-rape*; which has an open corol, divided at top into four ſegments, and nearly regular; there is a gland at the

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(f) Scutellaria galericulata *Linn*

baſe of the germ; and the capſule is unilocular and bivalvular. The common ſpecies (*g*) has a pubeſcent ſtalk, abſolutely undivided; the ſingular *feuillemort* hue of this plant, is alone ſufficient to betray it to you at firſt ſight.

Among ſuch as have quadrifid calyxes, are *Rhinanthus, Yellow Rattle* or *Cock's-comb*, and *Eyebright:* theſe have *Perſonate* Corols: the firſt has the calyx ſwelling; and an obtuſe, compreſſed bilocular capſule. The wild ſort (*h*), common in moiſt meadows, is known by the ſhortneſs and compreſſed form of the upper lip of the corol; the colour is yellow; the calyx is very large, and being an early flowering plant, this part grows dry before the time of mowing, and makes a craſhing or rattling ſound under the ſcythe. *Euphraſy* or *Eyebright*, once celebrated as fit "to purge the viſual ray," has the calyx cylindric; the anthers ſpinous at the baſe of one of their lobes; and the capſules of an oblong ovate form, and bilocular. The officinal ſpecies (*i*) has ovato-linear leaves, ſharply indented about the edges. It is an humble, neat plant, growing in dry paſtures and heaths; and the corol on a near view is very elegant.

(*g*) Orobanche major *Lin.*
(*h*) Rhinanthus Criſta-galli *Lin.*
(*i*) Euphraſia officinalis *Lin.*

In the largeſt ſection, with quinquefid calyxes, you will find the *Antirrhinum* genus compriſing forty-ſeven ſpecies. The corol is Perſonate, prolonged at the baſe into a bag or ſpur; and the ſeed-veſſel is a bilocular capſule. Of two ſpecies formerly mentioned to you, *Toadflax* (*k*) has linear leaves inclining to lanceolate, growing many together, upon an erect ſtalk; the flowers grow cloſe in ſeſſile ſpikes, terminating the ſtem; the under lip of the corol is hairy within, the chaps are orange-coloured, but the reſt is of a pale yellow, and it ends in a long ſpur. It is now in flower, or will ſoon be ſo. Accident has produced a ſtrange variation in this plant, by changing the corol from perſonate with four didynamous ſtamens, to regularly pentapetalous with five, the reſt of the plant remaining the ſame (*l*). Varieties partaking of the nature of two ſpecies are not uncommon (*m*), but as they are generally found among annual plants, and never produce ſeed, they are loſt almoſt as ſoon as they come to perfection. Whereas this, being perennial, and creeping much at the roots, has been preſerved as an example of monſters in vegetable nature. *Snapdra-*

(*k*) Antirrhinum Linaria *Lin.*

(*l*) This is deſcribed at length under the name of *Peloria* in the firſt volume of *Amœn. Acad.*

(*m*) Theſe are called *Hybridous* plants, or *Mules.*

gon (*n*) has the leaves of the calyx rounded at top; the flowers growing in a ſpike; and the corols ſpurleſs; the colours of theſe are red with white or yellow mouths, or entirely white, or elſe white with yellow mouths: the leaves are lance-ſhaped and petiolate. Several ſpecies of *Antirrhinum* are wild on walls and in corn-fields; and ſeveral others are not uncommon in gardens: as *Three-leaved Toadflax* (*o*), an annual plant, having ovate, ſmooth, gray leaves, generally ternate, as the name implies, but ſometimes only in pairs: the flowers grow in ſhort ſpikes at the top of the ſtalks, and are ſhaped like thoſe of common Toadflax, only the tubes are not ſo long; they are yellow with ſaffron-coloured chaps. Two or three perennial ſpecies, with handſome ſpikes of blue flowers, and ſome of them ſmelling ſweet *(p)*, are uſually in large borders, among flowering ſhrubs, and other perennials.

Scrophularia or *Figwort* is another of theſe; the corol is of the topſy-turvy kind, almoſt globular in its form; the two upper diviſions are the largeſt and erect, the two ſide ones ſpread open, and the fifth below is reflexed. In many ſpecies, under the topmoſt diviſion,

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(*n*) Antirrhinum majus *Lin.*

(*o*) Antirrhinum triphyllum *Lin.*

(p) Antirrhinum purpureum, repens & monſpeſſulanum, &c. *Lin.*

in the chaps of the corol, there is a little flap reſembling a lip: the flower is ſucceeded by a bilocular capſule. Two ſpecies are ſufficiently common; one in woods and hedge-rows (*q*), with the angles of the ſtem blunted, and heart-ſhaped leaves, much prolonged at the tip, and marked with three riſing nerves: the other by river ſides and in the other watery places (*r*), with a membrane running along the ſtalk at the angles, and heart-ſhaped leaves blunted at the end. Theſe plants have a duſky ſhade ſpread over their green, and their flowers are of a dull red.

Foxglove, one of the moſt ſhowy of our wild plants, has an open corol, divided into four ſegments at top, and ſwelling out below, ſhaped like the fingers of a glove; the capſule ovate and two-celled. *Wild* or *purple Foxglove* (*s*) is diſtinguiſhed by having the leaves of the calyx ovate and acute, with the ſegments of the corol obtuſe, and the upper lip entire: the inſide of the corol is beautifully ſprinkled with ſpots reſembling eyes; and the leaves are large and wrinkled: red is the colour of the flower in its wild ſtate; when cultivated in gardens, it varies to white and yellow.

(*q*) Scrophularia nodoſa *Lin.*

(*r*) Scrophularia aquatica *Lin.*

(*s*) Digitalis purpurea *Lin.*

Bignonia has a *cyathiform* calyx, narrow at bottom, and ſpreading wide at top; a bell-ſhaped corol, ſwelling out below, and divided into five ſegments at top; and a two-celled *Silique* for a ſeed-veſſel, containing winged ſeeds laying cloſe over each other. The *Trumpet-flower* (*t*), with its trailing branches, that put out roots from the joints, to acquire ſupport and nouriſhment from trees, in Virginia and Canada, its natural places of growth; has pinnate leaves, the lobes of which are cut: the large trumpet-ſhaped flowers are orange-coloured. The *Catalpa* (*u*) is a large tree with leaves remarkably ſimple, and heart-ſhaped: the flowers are produced in great branching panicles; they are of a dirty white, with a few purple ſpots, and faint ſtripes of yellow; but what is moſt remarkable, they have only two perfect ſtamens, with ſmall rudiments of three others; the calyx alſo is not barely quinquefid, but divided quite to the bottom.

Acanthus, the leaves of which are ſaid to have given the firſt hint of the elegant Corinthian capital, is alſo of this Order, but of that ſection which has bifid calyxes: it has an irregular corol, without any upper lip; the

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(*t*) Bignonia radicans *Lin.*

(*u*) Bignonia Catalpa *Lin.*

lower one has three lobes; the anthers are villous, and the capſule is two-celled.

I cannot help remarking to you, ſince it has ſtruck me, that the greater part of the genera in the principal ſection of this order, is dedicated to the memory of eminent Botaniſts. Here ſtands the great Linnæus himſelf, ſurrounded with his choſen troops; the celebrated Arabian Avicenna; thoſe Fathers of the Science Geſner, Celſus, Columna; of Italy, Tozzi, Vandelli, Cornuti; the illuſtrious Frenchmen, Bignon, Ruellius, Cornutus, Dodart; Brovall the Swede; Buckner, Bontius, Volkamer, Beſler and other Germans; Oviedo the Spaniard; and of England old venerable Gerard, and in more modern times, Lord Petre and two contemporary Profeſſors of Oxford and Cambridge. The illuſtrious, the indefatigable Baron Haller, occupies a ſection alone, as he well merits, being himſelf an hoſt. This plan, of conſecrating newly diſcovered plants to perpetuate the memory of perſons who have been eminent in the ſcience, appears to me well imagined. Ladies have had this honour, as well as the men; and I have no doubt, dear Couſin, but that you will one day merit a nich in this temple.

LETTER XXIII.

Auguſt the 4th, 1775.

BEFORE any idea of ſyſtem or arrangement had gone abroad, every ſcientific eye perceiving a ſimilitude between the Cabbage and Turnep, the Stock and Radiſh, in the fructification; there was an univerſal agreement among authors to place theſe plants, and others like them, in the ſame ſection or diviſion of their books, and to treat of them all together. You have already ſeen (*v*) the nature of this ſimilitude, and have long been at no loſs in claſſing the *Cruciform* tribe: you have only to learn that the fifteenth Claſs (Tetradynamia) in the Syſtem of Linnæus, contains the ſame plants, as you have been accuſtomed to call *Cruciform*; and to recollect that it has this long name from four of the ſtamens being more powerful, or longer than the remaining two; the circumſtance on which Linnæus founds the character of the Claſs; and which diſtinguiſhes it from the ſixth, wherein the ſix ſtamens are of equal length, or at leaſt not of that regular, proportional inequality that we diſcover in the Claſs now before you.

(*v*) In Letter II.

It will ſuffice to examine a few of the genera, and ſpecies, which are not extremely numerous (*w*), and therefore my preſent letter will not extend to that frightful length that ſome of the former have done.

The *Siliculoſe* or ſhort-podded Order leads the way, and is ſubdivided into two ſections; the firſt containing thoſe which have the ſilicle entire, and the ſecond ſuch as have the ſilicle notched at top. From the firſt ſubdiviſion I ſhall ſelect *Honeſty* for your obſervation, becauſe it is common in gardens, and has larger parts than moſt of theſe flowers. The ſilicle is oval, entire, quite flat, and ſtands on a pedicle; the valves are equal to the partition, parallel and flat: the leaflets of the calyx are bagged. The brilliant whiteneſs of theſe ſilicles has occaſioned this plant to be called *White Sattin*; and from the ſhape of them it is named *Lunaria* and *Moonwort*. Linnæus mentions but two ſpecies; the *annual* (*x*) differing from the *biennial* (*y*) in having larger flowers of a lighter purple, and the pods longer and narrower; they have both heart-ſhaped leaves, indented on their edges, are a little hairy, and end in acute points; the lower ones

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(*w*) The genera are 32, and the ſpecies 286.

(*x*) Lunaria annua *Lin.*

(*y*) Lunaria rediviva *Lin.*

are on long petioles, but the upper ones ſit cloſe to the ſtalk.

Of the ſecond ſubdiviſion is the *Candy-tuft* or *Iberis,* known by an irregular corol, with the two outer petals larger than the two others. *Red Candy-tuft* (z) is an annual herbaceous plant with red flowers growing in a kind of umbel; your gardener ſows it in patches about the borders of your flower garden; it has lance-ſhaped leaves drawn to a point; the lower ſerrate, the upper ones quite entire: the flowers of this are ſometimes white, and then it is confounded with the bitter ſpecies (*a*), which however has the leaves not ſo ſharp pointed, and with only few indentations; the flowers alſo grow in a raceme, and the plant is more branched.

In this ſubdiviſion alſo ranges *Scurvy-graſs* and *Horſe-radiſh,* agreeing in a heart-ſhaped turgid, rugged ſilicle, the valves of which are gibbous and obtuſe. *Officinal* or *Garden Scurvy-graſs* (*b*) has a branching ſtalk; the lower leaves roundiſh and hollowed next the petiole; the ſtem-leaves oblong and ſubſinuous: the white flowers are produced in cluſters at the ends of the branches. *Engliſh Sea Scurvy-graſs* (*c*) has longer leaves, and all of them ſinuate. *Horſe-radiſh* (*d*), which few beſides botaniſts obſerve in flower, has the radical leaves lance-ſhaped, and notched about the edges, the ſtem-leaves gaſhed.

(z) Iberis umbellata *Lin.*
(*a*) Iberis amara *Lin.*
(*b*) Cochlearia officinalis *Lin.*
(*c*) Cochlearia anglica *Lin.*

The ſecond Order, containing the *Cruciform* flowers, ſucceeded by a *Silique* or long Pod, is alſo ſubdivided into two ſections; in the firſt of which the leaflets converge at top, in the ſecond they gape. *Radiſh*, *Eryſimum*, *Stock*, *Wall-flower*, *Rocket*, *Arabis*, *Cabbage*, *Turnep*, &c. range in the firſt ſection: *Woad*, *Sea Colewort*, *Cardamine*, *Muſtard*, *Charlock*, *Water-Creſs*, &c. in the ſecond. *Radiſh* has a cylindric, jointed, toroſe or ſwelling ſilique; and one pair of glands between the ſhorter ſtamens and the piſtil, with a ſecond pair between the longer ſtamens and the calyx. *Eryſimum* has a columnar ſilique, with four equal ſides. Of this there are ſeveral wild ſpecies: as firſt, the *common* (*e*), growing by road ſides, well diſtinguiſhed by its runcinate leaves, and ſiliques preſſed cloſe to the ſtalk: ſecondly, *Winter-creſs* (*f*) with lyrate leaves, the outmoſt lobe roundiſh; and ſpikes of yellow flowers, growing by ditch ſides: and thirdly, the garlick-ſmelling, called thence *Sauce-alone*, and from the uſual place of its growth,

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(*d*) Cochlearia Armoracia *Lin.*
(*e*) Eryſimum officinale *Lin.*
(*f*) Eryſimum Barbarea *Lin.*

growth, *Jack-by-the-hedge* (*g*), has heart-ſhaped leaves : the flowers are white, but the ſmell betrays it at once.

Stock and *Wall-flower* have two leaflets of the calyx gibbous at the baſe ; the germ has a glandular toothlet on each ſide ; and the ſeeds are flat. The two ſpecies are thus diſtinguiſhed. *Wall-flower* (*h*) has acute, ſmooth leaves, with angled branches. *Stock* (*i*) has obtuſe hoary leaves, with flatted ſiliques truncate at top : both have ſhrubby ſtems, and lance-ſhaped entire leaves. The *Annual* or *Ten-week Stock* (*k*) differs in having an herbaceous ſtalk, the leaves ſomewhat toothed, the petals notched, and the ſiliques cylindric and acute at the end. *Rocket* * has the petals obliquely bent ; a gland on each ſide within the ſhorter ſtamens ; the ſtigma forked, with the parts converging at top ; and the ſilique ſtiff and upright.

Arabis has four glands, within the leaflets of the calyx, like reflected ſcales. Some of the ſpecies are wild (*l*), and the *Alpine* ſort (*m*) is now common in many gardens :

(*g*) Eryſimum Alliaria *Lin.*

(*h*) Cheiranthus Cheiri *Lin.*

(*i*) Cheiranthus incanus *Lin.*

(*k*) Cheiranthus annuus *Lin.*

* Heſperis *Lin.*

(*l*) Arabis thaliana, ſtricta, Turrita *Lin.* but the laſt has glands as in *Braſſica.*

(*m*) Arabis alpina *Lin.*

the leaves of this embrace the ſtalk, and are toothed about the edges; it bears white flowers in looſe *corymbs*. *Cabbage* (*n*), *Turnep* (*o*), *Coleſeed* (*p*), &c. all agree in having the glands diſpoſed as in the Radiſh; the leaflets of the calyx are erect; the tails of the corols hardly ſo long as the calyx; the ſilique is roundiſh, a little flatted on each ſide, with the valves ſhorter than the partition; and filled with ſeveral globoſe ſeeds.

Of the ſecond ſection, *Woad* has a lance-ſhaped, bivalve, one-celled ſilique, containing one ſeed only, and deciduous; the valves are boat-ſhaped. The ſpecies cultivated for dying (*q*) has the radical leaves notched and petiolate; the ſtem-leaves ſagittate or ſhaped like the head of an arrow, and embracing the ſtalk; and oblong ſilicles. It is a large plant, with corymbs of ſmall yellow flowers. *Sea Colewort* has a globoſe ſilique, or rather dry berry, which is deciduous, and contains one ſeed; but its moſt remarkable character is, that the four long filaments are forked at the end, and the anthers are born on the outer forks. Our ſpecies (*r*) has the ſtalk and leaves ſmooth.

(*n*) Braſſica oleracea *Lin.*
(*o*) Braſſica Rapa *Lin.*
(*p*) Br. Napus *Lin.*
(*q*) Iſatis tinctoria *Lin.*
(*r*) Crambe maritima *Lin.*

Cardamine, *Cuckow-flower* or *Lady's Smock*, (forgive the vulgar name) has the calyx gaping a little; two glands, one on each ſide between the ſhorter ſtamens, and the calyx; and an elaſtic ſilique, the valves rolling back with force when the ſeeds are mature, and thus throwing them off to ſome diſtance. There are many ſpecies wild, but that which is common in moiſt meadows, and on the banks of brooks (*s*), has pinnate leaves, the folioles on the radical leaves roundiſh, on the ſtem-leaves lance-ſhaped. The alluſions to the whiteneſs of the corols will not always hold, ſince in ſome countries they are purple.

Muſtard has the tails of the corols ſtraight, and the glands as in the Cabbage genus, to which it is very nearly allied; differing from it only in the circumſtance firſt mentioned, and in having the leaflets of the calyx ſpreading: the ſilique indeed is different, being toroſe, and rough, with the partition uſually very long; but this is reſerved for the ſpecific diſtinction. The wild ſpecies, a weed ſo common among corn, and generally called *Charlock* (*t*), has many-angled, toroſe, ſmooth ſiliques, longer than the two-edged beak. *Black* or *common Muſtard* (*u*)

(*s*) Cardamine pratenſis *Lin.*

(*t*) Sinapis arvenſis *Lin.*

(*u*) Sinapis nigra *Lin.*

has ſmooth ſiliques preſſed to the raceme, or common bunch of the fructification. *White Muſtard* (*v*) has the ſiliques hiſpid, terminated by a very long, oblique, ſword-ſhaped beak. If you ſuffer ſome of the plants which your gardener ſows for ſmall ſallad to grow up and flower, you will find it to be the laſt named ſpecies. Common Muſtard is a much larger plant, growing four or five feet high; the lower leaves large and rough, like thoſe of the Turnep. Charlock does not grow more than two feet in height; the leaves, which are alſo rough, are ſometimes jagged, and ſometimes entire.

Water-Creſs is of a numerous genus, there being twenty-ſeven ſpecies of *Siſymbrium.* The corol is ſpreading as well as the calyx in this genus; and the ſilique gapes with ſtraightiſh valves. The ſpecific character of *Water-Creſs* (*w*) are, ſhort, declining ſiliques, and pinnate leaves, with the lobes a little heart-ſhaped. The flowers are white, and grow in a corymb (*x*). There is another ſpecies, called *Flixweed* (*y*), not uncommon on dunghills, where rubbiſh is thrown out, by way ſides, and in uncultivated places: this has decompound pinnate

(*v*) Sinapis alba *Lin.*

(*w*) Siſymbrium Naſturtium *Lin.*

(*x*) See more in Letter XVII.

(*y*) Siſymbrium Sophia *Lin.*

leaves, and very ſmall corols, the petals being leſs than the calyx: the ſilique is very long and ſlender, filled with ſmall, roundiſh ſeeds: the leaves are as finely cut as Roman Wormwood; and the ſmall yellow flowers are produced in looſe corymbs, at the top of the ſtalks.

The ſeaſon, dear Couſin, is now in its wane, and a journey I muſt make on affairs of buſineſs, obliges me to leave the completion of my plan to another ſummer. If leiſure and health are then granted me, I ſhall with pleaſure reſume the employment which you honour with your attention. In the mean time you and your fair daughter have enough to amuſe you for the autumn, and even 'till winter confines you to the arrangement of your ſummer's labours within.

LETTER XXIV.

June the 1ſt, 1776.

SOME neceſſary occupations, dear Couſin, have prevented me from reſuming my pleaſing taſk ſo ſoon as I had wiſhed. But the ſpring has not been unprofitably employed by you, in the examination of ſuch plants as were paſt flowering, before you received my former letters. You have done well by marking in your pocket-book, the names of all thoſe which have either wholly eſcaped your ſearch, or have preſented themſelves to you in a ſtate unfit for complete examination. You are not ſo unreaſonable as to expect that all nature ſhould be open to your view at once. On the contrary, I am charmed with your patience and aſſiduity, in awaiting the proper ſeaſons of flowering and fruiting; marking the times which authors have ſet down; and repeating your examinations in order to view plants in their different ſtates, when they ſometimes put on appearances ſo different, that to a leſs informed eye they might ſeem to be diſtinct ſpecies.

We are now arrived at a Claſs, of which you have had no previous information in the introductory letters, deſigned to give you a general knowledge of the moſt natural. The

Claſs *Monadelphia* however is a natural, as well as a moſt beautiful one. The union of the filaments at bottom into one body, or brotherhood as it were, is the leading character, and the occaſion of the name. You will recollect that hitherto the ſtamens have been ever free and diſtinct from each other, how many ſoever you may have found in a ſingle flower; you will alſo recollect having been informed, that in the ſixteenth and ſucceeding claſſes, they are united, either at top or bottom, into one body or more. In this, as I obſerved before, the filaments all join below, next the receptacle, ſome higher than others; all of them, together with the anthers, being ſtill entirely ſeparate at top.

If then you have met with a plant, which has five, ten, or eſpecially many ſtamens, and you have not been able to aſſign it a place in the fifth, tenth or thirteenth Claſſes, examine it a little more attentively, and conſider whether it has not a peculiar port or ſtructure, announcing it to be of a natural tribe. It may perhaps have a perſiſtent calyx; but if it is alſo double, you may be almoſt certain that it ranges here. The corol of your flower may perhaps have five heart-ſhaped petals, the ſide of one embracing or at leaſt touching that which is next to it, in a direction contrary to the ſun's apparent motion. The filaments perhaps, connected at bottom only, whether ſlightly, or for a conſiderable portion of their lengths, are gradually ſhorter as they recede from the middle; and the anthers are incumbent, or lie along over the top of them. You find the receptacle of the fructification prominent in the centre of the flower; the top of this receptacle ſurrounded by erect germs forming a jointed ring: all the ſtyles united below into one body with the receptacle; but diſtinguiſhed at top into as many filaments as there are germs: theſe germs becoming a capſule conſiſting of as many cells as there are piſtils in the flower; and frequently conſiſting of as many connected *Arils.* In each of theſe cells lurks a kidney-ſhaped ſeed.

If you have not already divined this riddle, take the flower of a wild Mallow, an Althæa, Lavatera, or other plant reſembling theſe; examine it by the characters juſt laid down, and you will have a perfect idea of the Claſs *Monadelphia.* From the circumſtance of the receptacle ſtanding up in the middle of the flower, like a column, theſe alſo have the name of *columniferous* plants.

The Orders are five, taken from the number of the ſtamens, which you remember determined the Claſs, in the firſt thirteen Claſſes; but being now no longer uſed for that purpoſe, may ſerve very well for the other.

The fruit was formerly taken for diſcriminating the genera. This being found inſufficient, ſucceeding nomenclators had recourſe to the leaves; but Linnæus has for this purpoſe wiſely adopted the calyx, which is always preſent, and is remarkable for its ſtructure in this Claſs. The illuſtrious Swede has ever ſhown great ſagacity in ſeizing that part of the plant, which is moſt conſtant, and furniſhes the greateſt choice of permanent variations, whereon to found the eſſential characters of his genera and ſpecies*.

Not having taken the piſtil for the diſtinction of the Orders, that part remains to aſſiſt us in characteriſing the genera. Accordingly in the firſt Order of this claſs, in which the flowers have five ſtamens, two genera have one, and two have five ſtyles: the number of cells in the capſules ſerves to complete the generic character. Thus *Hermannia* has five ſtyles and a five-celled capſule: to which we may add that the five petals of the corol are rolled ſpirally in a direction contrary to the ſun's apparent motion; and that their tails have a little membrane on each ſide uniting to form a cowled tube. Though there are many ſpecies of this genus, yet perhaps none of them may offer themſelves to your view. We will proceed therefore to a favourite genus, that ranges in the ſecond order, or that which has ten ſtamens: I mean *Geranium*, which, out of its 82 ſpecies, will furniſh you ample matter for examination, eſpecially as I know you cultivate ſo many of them. Before you determine the circumſtances in which they differ, let us ſee in what they all agree; this is in having one ſtyle terminated by five ſtigmas; and a fruit compoſed of five grains, and beaked; whence its names of *Geranium* and *Cranesbill*. We may add that the calyx is ſingle and five-leaved, as well as the corol; that the filaments are alternately longer and ſhorter, but all ſhorter than the corol; and very ſlightly connected in thoſe which have a regular corol; that the ſtyle is longer than the ſtamens, and perſiſtent; and that each of the five ſeeds is terminated by a tail or awn, aſſiſting to form the beak, and which when the ſeed is ripe becomes ſpiral, and thus detaches the ſeed from the plant.

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* Genera 35, and Species 256, in this Claſs.

The African ſpecies, of which we have ſo many from the Cape of Good Hope, have the five parts of the calyx united at bottom; the petals unequal; and ſeven only of the filaments furniſhed with anthers; the flowers grow many together in a kind of umbel; the ſeeds are naked, with a feathered awn, and the leaves grow alternate upon the ſtalk, which is ſhrubby.

In this firſt ſection you find, among many others, the *Fulgid* (z), with a fleſhy ſtem, putting out but few branches; the leaves three-parted and gaſhed, the middle ſegment much larger than the others; frequently falling off, ſo as to give the ſtalks an appearance of being dead during the ſummer; the flowers are produced on ſhort ſootſtalks, in a ſort of double umbel, each ſuſtaining but two or three flowers, remarkable for their deep ſhining ſcarlet colour.

(z) Geranium fulgidum *Lin.*

The well known *Scarlet* (*a*), which would be at leaſt as much eſteemed as the Fulgid, were it not more common. The leaves are almoſt orbicular, except that they are hollowed next the petiole; they are notched about the edge, but not gaſhed or lobate; their ſurface is downy, and they ſtain the fingers if handled roughly, whence the trivial name of *inquinans* or ſtaining. This is a much loftier plant than the laſt, growing as high as eight or ten feet; and ſends out abundance of erect branches: the flowers in the umbels are numerous, and are produced on very long peduncles.

The *Papilionaceous* (*b*), ſo called, becauſe the corols have ſomething the appearance of butterfly or pea-bloſſom flowers, the two upper petals, which are large, turning up like the banner or ſtandard in thoſe flowers;

(*a*) Geranium inquinans *Lin.*
(*b*) Geranium papilionaceum *Lin.*

theſe are finely variegated, but the three under petals being reflexed and ſmall are ſcarcely obſerved, but on a near inſpection; the flowers are many in each umbel: the leaves are large, angular, rough, and ſtand on long petioles.

The *Hollow-leaved* (*c*) has roundiſh leaves contracted on the ſides ſo as to ſtand hollow; the edges are ſharply indented: the flowers are large, and produced in large looſe umbels; the corols are purple: it is a plant of large ſtature, and very hairy.

There is another ſort, or variety, very like this; but it has leaves of a thicker ſubſtance, and divided into ſeveral acute angles: the branches are not ſo irregular, and the bunches of flowers are not ſo large..

The *Horſe-ſhoe* (*d*) is perhaps the ſpecies moſt commonly known of all the Africans; the dark or purpliſh mark, in ſhape of a horſe-ſhoe upon the leaves, ſhows this Geranium to the eye at firſt ſight; but it is not abſolutely permanent, for we have varieties without it: we muſt have recourſe therefore to the form of the leaves, as a more certain diſtinction: they are orbicular, hollowed next the petiole, divided on the circumference into ſeveral obtuſe ſegments, each of which is ſlightly indented. This ſort is

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(*c*) Geranium cucullatum *Lin.*—cowled.

(*d*) Geranium zonale *Lin.*

very branching: the flowers are produced in large, cloſe umbels, on long peduncles, and vary from a light purple to a high ſcarlet.

The *Vine-leaved* (*e*) has lobate, aſcending, pubeſcent leaves, having the ſmell of Baum, when rubbed; the flowers grow in a cloſe head, on long peduncles, riſing much higher than the branches; they are ſmall, and pale blue.

The *Roſe-ſcented (f)* has alſo lobate leaves, waved and villous; like the laſt, the flowers grow in cloſe heads; they are of a purpliſh blue: the branches are very irregular and weak; and the whole is weaker and grows taller than the former: the leaves when rubbed, ſmell like dried roſes.

The plants of the ſecond ſection have many things in common with thoſe of the firſt; but differ in being herbaceous, and having the leaves oppoſite. Of theſe the *Odorous* (*g*) is remarkable for its powerful ſcent, ſomething like Aniſeed: this has a very ſhort fleſhy ſtem, with long branches, and heart-ſhaped leaves extremely ſhort: the flowers are produced from the ſide of long proſtrate ſtalks, upon ſlender peduncles, three, four or five together; they are white, and very ſmall.

(*e*) Geranium vitifolim *Lin.*

(f) Geranium capitatum *Lin.*

(*g*) Geranium odoratiſſimum *Lin.*

The *Night-ſcented* (*h*) has ſeſſile calyxes, and bifid one-leaved ſcapes: the leaves are hairy, and almoſt as finely divided as the carrot; the ſtalks are about a foot high, and have two or three ſmaller leaves that are ſeſſile; hence ariſe two or three naked peduncles, terminated by an umbel of yellowiſh flowers, marked with dark purple ſpots, ſmelling very ſweet after ſun-ſet. Linnæus has taken his trivial name from the dulneſs of the colour in the flower.

The third ſection contains ſuch Geraniums as have only five of the ſtamens anther-bearing; five-leaved calyxes, and fruits hanging down. The corols of theſe are leſs irregular; and the ſeeds are naked, terminated by a hairy awn.

Of this ſection we have ſome European ſpecies, as *Hemlock Craneſbill* (*i*) common in ſandy ſoils: this has a branching ſtalk, pinnate leaves, with the pinnæ gaſhed and obtuſe, and many flowers on a peduncle. Very like this is *Muſk Craneſbill* (*k*), but it is a larger plant, much leſs common, and eaſily known by its muſky odour. The diviſions of the leaves are pinnatifid. Some ſpecies (*l*) of this ſection are remarkable for the large-

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(*h*) Geranium triſte *Lin.*

(*i*) Geranium cicutarium *Lin.*

(*k*) Geranium moſchatum *Lin.*

(*l*) Geranium arduinum, gruinum, ciconium *Lin.*

neſs

neſs of their beaks, and furniſh a good idea of the name of the genus.

In the three remaining ſections, all the ten filaments are topped with anthers; the calyxes are five-leaved; the corols regular; the ſeeds covered with an *aril*, and terminated by a ſmooth awn. In the fourth ſection, the flowers are conjugate; that is, there are two always on every peduncle: the plants are perennial.

Some of the largeſt and handſomeſt of the European ſorts range in this ſection; as *Spotted Craneſbill* (*n*), with the peduncles and leaves alternate, the calyxes a little awned, the petals waved, and the ſtem erect. The leaves are divided into five or ſix lobes, laciniate on their edges; thoſe near the root ſit on long petioles, but on the upper part of the ſtalk they are ſeſſile. The flowers are of a dark purple. There is a variety of this with light purple corols.

Meadow Craneſbill (*o*) has the leaves divided into ſix or ſeven lobes, cut into ſeveral acute ſegments; they are wrinkled, and rather peltate; the petals are entire, and of a fine blue.

The Geraniums of the fifth ſection differ from thoſe of the fourth, only in being annual. Moſt of the common European ſorts

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(*n*) Geranium phæum *Lin.*

(*o*) Geranium pratenſe.

are of this diviſion: as *Herb Robert (p)* known by its hairy pointed ten-angled calyxes. The leaves are doubly pinnate, with the end lobes confluent; they are generally hairy, the ſtalks red, and the whole plant has a ſtrong hircine ſmell. *Shining Craneſbill* (*q*) has the calyxes pyramidal, angled, elevated and wrinkled; the leaves rounded and five-lobed: the whole plant is ſmooth and ſhining; the ſtalks are red.

The *common Dove's-foot* or *ſoft Craneſbill* (*r*) has the peduncles and floral leaves alternate; the petals bifid or rather obcordate; the calyxes awnleſs but ending in a ſhort point; and the ſtem rather erect. The ſtipules are alſo bifid: the leaves are very ſoft, kidney-ſhaped, divided half way into five or ſeven parts, and each of theſe lobes trifid and blunt. This is very common, eſpecially in ſandy ſoils. Another (*ſ*), very like it in many reſpects, but more partially diſtributed, has entire petals, ſcarcely longer than the calyx; and the ſtem more proſtrate. *Long-ſtalked Craneſbill* (*t*) has peduncles longer than the leaves, which are divided into five multifid lobes acute at the end; the calyxes are awned, and the arils are ſmooth. The peduncle

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(*p*) Geranium Robertianum *Lin.*
(*q*) Geranium lucidum *Lin.*
(*r*) Geranium molle *Lin.*
(*ſ*) Geranium rotundifolium *Lin.*
(*t*) Geranium columbinum *Lin.*

is very long, and the lobes of the leaves are doubly trifid. *Jagged Craneſbill* (*u*) has the leaves divided into five parts, and each of thoſe into three acute ſegments; the petals are of the length of the calyx, and notched, and the arils are villous: this has the leaves more and finer cut than any of the others.

Of the laſt ſection, with one-flowered peduncles, we have a handſome ſort wild, but not common, with orbicular leaves, divided into five or ſeven parts, and each of thoſe into three: the flowers ſtand on long hairy peduncles, the corols are large, and of a deep purple (*v*). Many more ſpecies are known to the curious; but I have only ſelected ſuch as the fields, the garden, and your little conſervatory are moſt likely to furniſh you.

In this Claſs we find a ſingular plant, which has naturally eleven ſtamens; a number which you did not find among the Claſſes. Having the Monadelphic character, it here forms the Order *Endecandria*, and ſtands alone. Being a plant little known, I inſiſt no longer on it (*w*).

The laſt order *Polyandria* is much the moſt conſiderable in number of genera and ſpecies. You have here *Silk-Cotton* (*x*) the

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(*u*) Geranium diſſectum *Lin.*

(*v*) Geranium ſanguineum *Lin.* Bloody Craneſbill.

(*w*) Brownea coccinea *Lin.*

(*x*) Bombax *Lin.*

True Cotton (y), ſo much uſed in our manufactures, the numerous genus of *Sida* or *Indian Mallow*, *Althæa* or *Marſh-Mallow*, *Alcea* or *Holly-hock*, *Mallow*, *Lavatera*, *Hibiſcus*, &c. The two firſt, with Sida and Hibiſcus, have one piſtil only; the reſt have many. Sida and Bombax have a ſingle calyx, but all the others have it double. The exterior calyx in Cotton and Lavatera is trifid; in Mallow conſiſts of three leaflets; in Alcea is ſexfid; in Hibiſcus octofid; in Althæa novemfid. Lavatera, Mallow, Alcea and Althæa agree in having many ſeeds in a ring round a column, each covered with its proper aril. The ſeed-veſſel of Hibiſcus is a capſule compoſed of united cells including many ſeeds.

The officinal (z) ſpecies of Marſh-Mallow is known by its ſimple downy leaves, hoary to the ſight and very ſoft to the touch; they are angular, but not divided to the bottom, and therefore ſimple. The flowers are like thoſe of the Mallow, but ſmaller and paler.

Of Mallow there are many ſpecies: that which is ſo very common (*a*), has an erect herbaceous ſtem; five or ſeven-lobed acute leaves, with both petioles and peduncles hairy. *Dwarf Mallow* (*b*) has a proſtrate ſtem;

(*y*) Goſſypium *Lin.*

(*z*) Althæa officinalis *Lin.*

(*a*) Malva ſylveſtris *Lin.*

(*b*) Malva rotundifolia *Lin.*

ſtem; orbiculate leaves hollowed next the petiole, obſcurely five-lobed; the fruit-bearing peduncles declining. This is every way a ſmaller plant. *Vervain Mallow* (*c*) has an erect ſtem, rough with bunched expanded hairs, many-parted roughiſh leaves, the lobes of which are obtuſe and indented; the flowers large, and light purple. Another wild ſpecies called *Muſk Mallow* (*d*), is very like this, but has the radical leaves kidney-form and gaſhed; the ſtem leaves five-parted, and the diviſions finely cut into narrow ſegments: the flowers have a muſky ſmell, and the ſtem has ſingle erect hairs ſitting on a prominent point. *Cape Mallow* (*e*) has an arboreſcent ſtem ten or twelve feet high, and the leaves five-lobed and hollowed at the baſe. The whole plant is hairy, and theſe hairs exude a viſcid aromatic juice. The flowers are deep red, and ſmaller than thoſe of the common Mallow. The trivial name informs us of its country, and conſequently that it ſtands in need of protection from you.

The gigantic, the gaudy *Hollyhock* is of the genus *Alcea*: there are many varieties with double flowers, and different colours, as white, red of all hues from pale carna-

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(*c*) Malva Alcea *Lin.*
(*d*) Malva moſchata *Lin.*
(*e*) Malva capenſis *Lin.*

tion to almoſt black, and yellows of different ſhades; but there are only two ſpecies *(f)*, the firſt having roundiſh leaves, cut at the extremity only into angles; the ſecond palmate, cut deeply into ſix or ſeven ſegments, like the fig leaf. Of the firſt there is a dwarf variety with variegated flowers, much eſteemed, and called *Chineſe Hollyhock.*

The ſhrub vulgarly named *Althæa Frutex* is an Hibiſcus; a very numerous genus, comprehending no leſs than twenty-ſix ſpecies, moſt of them inhabitants of either India, and not generally known here. The *Althæa Frutex* (*g*) however is a native of Syria, and bears the rigour of our climate, though it is very late ere it produces its flowers. The ſpecific characters are, an arboreſcent or woody ſtem, and wedge-ſhaped leaves, divided at top into three lobes, and ſtanding on ſhort petioles. The flowers are bell-ſhaped, and of various colours—pale or bright purple with dark bottoms, white with purple bottoms, variegated with dark bottoms, and yellow with the ſame: theſe flowers being large, gay and numerous, make a handſome appearance, and give the completeſt idea of the claſſical character.

China Roſe alſo, notwithſtanding its name,

(f) Alcea roſea & ficifolia *Lin.*

(*g*) Hibiſcus ſyriacus *Lin.*

is no Roſe, but an *Hibiſcus* (*h*), with a woody ſtem, and ovate, ſharp-pointed leaves, ſerrate about the edges: the colour, ſize, and appearance of the flowers, when they are double, gave occaſion to the name of Roſe; they frequently appear on Chineſe paintings and paper, and are certainly very ornamental. The *Muſk plant* (*i*) of the Weſt Indies is another ſpecies of *Hibiſcus*; its kidney-ſhaped ſeeds have a very ſtrong ſmell of Muſk. The bark of ſome ſpecies (*k*) is formed of fibres ſtrong (*l*) enough for cordage. One of them is cultivated in the Weſt Indies for its pods, which they put into their ſoups. But all this we have nothing to do with as Botaniſts.

(*h*) Hibiſcus Roſa Sinenſis *Lin.*
(*i*) Hibiſcus Abelmoſchus *Lin.*
(*k*) Hibiſcus vitifolius & Sabdariffa *Lin.*
(*l*) Hibiſcus eſculentus *Lin.*

LETTER XXV.

June the 4th, 1776.

AFTER a ſhort excurſion we are returned, dear Couſin, among your old acquaintance; and you have only to apply to the term *Diadelphia*, which is the name of the ſeventeenth Claſs in Linnæus's ſyſtem, all the knowledge you firſt acquired from the letter on Papilionaceous flowers (*m*), and which you have ſince increaſed ſo much by your obſervation and experience. You have admired the ſingularly admirable and beautiful ſtructure of theſe flowers, in which all the plants of this Claſs agree: you will now not be diſpleaſed to accompany me in an enquiry into their generic and ſpecific differences. The number of genera in this Claſs is 57, of ſpecies 695. The Orders are four, taken from the number of ſtamens, which in the firſt order is five, in the ſecond ſix, in the third eight, and in the fourth ten. In the order *Pentandria* however there is only one genus; in the order *Hexandria* two; and in the order *Octandria* three; ſo that you perceive the laſt (*Decandria*) abſorbs the far greater part of the Claſs; and what you have learnt of Papilionaceous flowers

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(*m*) Letter III.

belongs indeed principally to this Order. Of the three firſt Orders there are only two genera, which you will have an opportunity of obſerving; and we will begin if you pleaſe with them.

Fumitory has two filaments, each of them terminated by three anthers; it has the claſſical character therefore, and muſt be of the Order *Hexandria*. This genus has, beſides this, a two-leaved calyx, a ringent rather than a papilionaceous corol, the upper lip however anſwering to the banner, the lower lip to the keel, and the bifid chaps to the wings: the baſe of each lip is prominent, but the upper one the moſt; and one filament is incloſed in each. *Common Fumitory* (*n*), which you will readily meet with as a weed in your kitchen garden, is known by a weak, diffuſe, branching ſtem, multifid leaves dividing into three, and the lobes trifid; the flowers growing in a raceme, and each being ſucceeded by a round or rather obcordate one-ſeeded pericarp.

Milkwort has eight filaments each terminated with an anther, and all united at bottom; it appertains therefore to the order *Octandria* of this Claſs. The characters of the genus are, a five-leaved calyx, with two of the leaflets like the wings of the papilionaceous flower, and coloured; the banner

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(*n*) Fumaria officinalis *Lin.*

of the corol is cylindric; the legume is obcordate, or inverſe-hearted, and two-celled. Many of the ſpecies have a beard, creſt, or pencil-form appendage to the keel; thoſe which have none are called beardleſs; and hence a commodious ſubdiviſion of this large genus: the laſt are ſubdivided into ſhrubby and herbaceous; the herbaceous again into ſimple and branched. Of 37 ſpecies we have one only wild, and that is common on dry paſtures and heaths (*o*): it is of the creſted diviſion, and bears the flowers in a raceme; the ſtem is herbaceous, ſimple and procumbent, and the leaves are linear. This is a lowly little plant, with pretty flowers blue, red or white. There is a beautiful ſpecies (*) in the green-houſe, from the Cape, with a ſhrubby ſtem; oblong, ſmooth leaves, blunt at the end; and handſome flowers, large, white on the outſide, but bright purple within; the keel creſted, and ſhaped like a half moon. *Senega* (*p*) root, ſo famous among the American Indians as an antidote to the bite of the Rattle-Snake, is from a ſpecies of this genus.

The plants of the Order we are now to examine are obvious, not only by their papilionaceous flowers, but by their compound leaves,

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(*o*) Polygala vulgaris *Lin.*

(*) Polygala myrtifolia *Lin.*

(*p*) Polygala Senega *Lin.*

leaves, which in the greater part are pinnate, winged or feathered, but in others trifoliate (*q*). In ſome genera the pinnate leaves have the lobes in pairs only (*r*), but it is more common to have them terminate in an odd lobe (*s*). Many of this pulſe tribe have ſtems too weak to ſuſtain themſelves, they fly therefore to ſome ſtronger plant or other prop for ſupport, and they are furniſhed with the neceſſary means of helping themſelves, either by twining their ſtalks about and embracing their friend (*t*), or elſe by throwing out ſlender threads, like the vine, called *claſpers* or *tendrils*, by which they lay faſt hold (*u*).

Moſt of theſe plants having fruits that are eſculent either to us, quadrupeds or birds, produce flowers in great abundance, and cloſe bunches; in ſome of the genera they grow in a kind of umbel (*v*), much like thoſe of the ſecond Order of the fifth Claſs. I mention

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(*q*) As in Trifolium or Trefoil, which has its name from this circumſtance, Lotus, Medicago, Erythrina, Geniſta or Broom, Cytiſus, Ononis, Trigonella, Phaſeolus or Kidney Bean, Dolichos and Clitoria.

(*r*) Orobus, Piſum or Pea, Lathyrus or Everlaſting Pea, Vicia or Vetch, Ervum and Arachis.

(*s*) Biſerrula, Aſtragalus, Phaca, Hedyſarum, Glycyrriza or Liquorice, Indigofera or Indigo, Galega, Colutea, Amorpha and Piſcidia.

(*t*) Phaſeolus, Dolichos, Clitoria, Glycine.

(*u*) Piſum, Lathyrus, Vicia, Ervum.

(*v*) Lotus, Coronilla, Ornithopus, Hippocrepis, Scorpiurus.

tion theſe circumſtances, not as claſſical characters, but as leading features that may give you a ſhrewd ſuſpicion, rather than a certain aſſurance. When you find a plant endued with ſome of theſe ſubordinate characters, you, I am certain, will not determine it at once upon them—no, they will only lead you to a more ſtrict examination. Pinnate or trifoliate leaves, weak twining or climbing ſtems, no not even papilionaceous flowers will ſatisfy your diſcerning eye, 'till you have ſeen the union of the filaments at bottom. If you can procure any ſpecies of *Sophora* (*w*), you will be convinced of this; for without ſuch caution you would infallibly have been miſled; this genus agreeing with the pulſe tribe in every reſpect, except in having the ten filaments diſtinct.

The proper character of this Claſs you know is to have the filaments in two diſtinct bodies; and the character of the Order *Decandria* is to have nine filaments united at bottom into a membrane ſurrounding the germ, and a tenth ſingle, filling up the opening which is left for the germ to diſengage itſelf, when it is arrived at a ſtate proper to paſs into a pod or legume. I muſt advertiſe you however that this is not ſtrictly true of all the

genera;

(*w*) A genus of the Claſs *Decandria* and the Order *Monogynia*. Anagyris, Cercis, &c. have alſo the ſame appearance.

genera; there are no fewer than eighteen out of fifty, which have all the ten filaments connected, ſo that the germ cannot grow into a legume, without tearing aſunder the membrane formed of the filaments. You muſt not therefore be deterred from ſetting down a plant as of the Pulſe tribe, and of the Claſs *Diadelphia*, when you find the ten filaments united into *one*, incloſed within a papilionaceous flower, and furniſhed with the other marks of the Claſs. Of thoſe which anſwer regularly to the claſſical character, ſome have a pubeſcent ſtigma (*x*), and the reſt are diſtinguiſhed by their legumes, as we ſhall now ſee, that we are going to examine their diſtinctive marks more narrowly.

You will obſerve in this Claſs ſome trees, and many ſhrubs with papilionaceous flowers, as *Common* (*y*) and *Spaniſh* (*z*) *Broom:* both of a genus in which the ten filaments are all united, and form a membrane adhering cloſe to the germ; the ſtigma grows along the upper ſide of the top of the ſtyle, and is villous; the calyx is continued downwards, and is marked beneath with five little notches at the tip. *Spaniſh Broom*, with ſome other

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(*x*) Colutea, Phaſeolus, Dolichos, Orobus, Piſum, Lathyrus, Vicia.

(*y*) Spartium ſcoparium *Lin.*

(*z*) Spartium junceum *Lin.*

ſpecies, has ſimple leaves, in the reſt they are ternate, trefoil or three-lobed. In *Common Broom* however there is a mixture of both. In the firſt alſo the leaves are lance-ſhaped, and the ruſh-like branches are oppoſite, round, and produce the flowers from the top, in a looſe ſpike. In the ſecond the branches are angular, and the flowers come out ſingly for a conſiderable length towards the top. They are large, and of a bright yellow in both ſpecies. There is alſo a Spaniſh Broom with a white flower (*a*); which has leaves like the other, but the branches ſtriated, and the flowers in ſhort ſpikes or cluſters on the ſides of them; they are ſucceeded by large oval pods containing one ſeed, whence the trivial name. *Portugal Brooms* with trifoliate leaves and yellow flowers, differing little from ours: and a ſort with prickly branches, thence called *Prickly Cytiſus* (*b*).

We have ſome wild ſhrubs of an humbler growth, ſomewhat reſembling theſe, but of another genus called *Geniſta*; the characters of which are a two-lipped calyx, the upper lip two-toothed, the lower three-toothed; the banner of the corol oblong and reflected downwards from the piſtil and ſtamens; the piſtil depreſſing the keel, and the ſtigma involute.

(*a*) Spartium monoſpermum *Lin.*
(*b*) Spartium ſpinoſum *Lin.*

involute. *Dyer's weed,* called alſo *Wood-waxen* and *Baſe Broom* (*c*), which grows in paſtures and headlands, has ſmooth lance-ſhaped leaves, and erect, round, ſtreaked branches. *Needle Furze* or *Petty Whin* (*d*), which you find wild on heaths, has ſmall lance-ſhaped leaves, ſlender branches armed with long, ſimple ſpines; the flower branches are ſhort, have no ſpines, and have five or ſix flowers in a cluſter at the end of them: the colour of the corol in both ſpecies is yellow; and you would at firſt ſuppoſe that the former was a *Spartium,* and the latter a Furze, or of the genus *Ulex*; which however differs from both in having a two-leaved calyx, with the legume ſo ſhort as ſcarcely to emerge from it. We have only one ſpecies, than which nothing, as you know, is more common on all our heaths; it has the three different names of *Furze, Gorſe* and *Whins* (*e*) in different parts of the kingdom.

Reſtharrows are lowly kinds of ſhrubs, or rather underſhrubs, with purple flowers, growing on commons, barren paſtures, and headlands of corn fields; they have the name from the ſtrength and matting of the roots, which circumſtance has induced the Dutch

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(*c*) Geniſta tinctoria *Lin.*
(*d*) Geniſta anglica *Lin.*
(*e*) Ulex europæus *Lin.*

to ſow them on their ſea banks. The cylinder of filaments is quite entire at bottom, without any fiſſure, in this genus; the calyx is parted into five linear diviſions; the banner of the corol is ſtriated; and the legume, a ſection of which is a rhomb, is turgid and ſeſſile. We have two ſorts, one (*f*) with prickly ſmooth branches, and the flowers in a raceme, but coming out ſingly: the other (*g*) with villous leaves and branches, but without ſpines; the flowers in a raceme, but generally two together; both have ternate leaves, except that towards the top they are ſimple.

In *Anthyllis* the calyx is turgid and includes the legume, which is ſmall and roundiſh, containing one or at moſt two ſeeds. The only ſpecies we have wild is herbaceous, is called *Ladies-Finger* or *Kidney Vetch* (*h*), and is not uncommon in chalky paſtures; it has unequally pinnate leaves, and a double head of yellow flowers, but this latter character is not conſtant. The leaves are pubeſcent, and conſiſt of three or four pair of lobes; except two under the umbel, which are digitate. There are ſeveral flowering-ſhrubs of this genus; as that which is generally called *Jupiter's beard* or

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(*f*) Ononis ſpinoſa *Hudſoni*. Common, ſmooth or prickly Reſtharrow.

(*g*) Ononis inermis *Hudſoni*. Hairy Reſtharrow.

(*h*) Anthyllis Vulneraria *Lin*.

Silver-buſh (*i*) from the ſplendid whiteneſs of the leaves, which is owing to a fine nap or down that covers them; they are equally pinnate: the flowers are produced at the extremity of the branches, in ſmall heads, and are yellow.

Lupins, which are ſo well known in the flower garden, agree in a two-lipped calyx; in having five of the anthers round, and five oblong, and in the ſhell of the legume being coriaceous or leathery. The common *white* (*k*) ſort, which is cultivated as a pulſe in moſt of the ſouthern parts of Europe, has the flowers growing alternate, without appendages; the upper lip of the white corol is entire, the lower three-toothed: the ſeeds are orbiculate and flatted. There are three ſorts with blue flowers: the *Perennial* (*l*), which is the only one that is not annual, with alternate, unappendaged flowers; the upper lip of the corol notched, the lower one entire. This is an American plant: the digitate leaves are compoſed of ten or eleven lobes; whereas thoſe of the former have no more than ſeven or eight: the flowers grow in long looſe ſpikes, and are pale blue. The *great blue* (*m*), with alternate appendaged flowers; the upper-lip

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(*i*) Anthyllis Barba Jovis *Lin.*
(*k*) Lupinus albus *Lin.*
(*l*) Lupinus perennis *Lin.*
(*m*) Lupinus hirſutus *Lin.*

lip two-parted, the lower three-toothed. This has a ſtrong ſtem, covered with a ſoft browniſh down; the leaves have nine, ten or eleven hairy, ſpatulate lobes: the flowers are in whorls, forming a ſort of ſpike; they are large, and of a beautiful blue: the pods are very large, and have three roundiſh compreſſed ſeeds, very rough and of a purpliſh brown. *Narrow-leaved* or *tall blue Lupin* (*n*), has the flowers alternate and appendaged or pedunculate; the upper lip of the corol two-parted, the lower three-toothed: the lobes of the leaves are linear. The *Varied* (*o*) is not very different in appearance from this: the flowers grow in half whorls, and are appendaged; the upper lip is bifid, and the lower ſlightly three-toothed: the corols are light blue or purple. It is ſhorter than the laſt; the leaves have fewer lobes, and ſtand on ſhorter petioles. The *Hairy* (*p*) has the flowers in whorls and appendaged, with the upper lip two-parted, like the Great Blue Lupin; which it much reſembles in ſtature and appearance; but the corols are fleſh-coloured with the middle of the banner red, the lower lip is entire; the plant is hairy all over, and the leaves are lance-ſhaped, and a little obtuſe at the end. The *Yellow* (*q*)

(*n*) Lupinus anguſtifolius *Lin.*
(*o*) Lupinus varius *Lin.*
(*p*) Lupinus piloſus *Lin.*
(*q*) Lupinus luteus *Lin.*

is eſteemed for the ſweetneſs of its flowers: they grow in whorls and on peduncles; the upper lip of the corol is two-parted, the lower three-toothed. Thus have you a hiſtory of the whole genus of Lupin; for theſe are all the ſpecies hitherto known: and as you may eaſily have them growing together, you may compare them at leiſure, and aſcertain all their agreements and differences: could we do this in every genus, how clearly might we diſtinguiſh the ſpecies! but remember that culture may produce fictitious characters, which miſlead unwary Botaniſts.

In all the genera hitherto examined, the filaments have made one body at bottom; in the reſt which I ſhall now offer to your conſideration, nine only are united, and the tenth is free, according to the proper character of the Claſs. We will begin with ſome genera, diſtinguiſhed (as I mentioned before) by a pubeſcent ſtigma. *Phaſeolus* or *Kidney Bean,* in having the keel with the ſtamens and ſtyle ſpirally twiſted, poſſeſſes one obvious character, that diſcriminates it ſufficiently from all its congeners. Some of the ſpecies have an outer calyx, conſiſting of two roundiſh leaflets; which may more properly be called *bractes*. *Lathyrus* or *Everlaſting Pea* has a flat ſtyle, villous above, growing broader upwards: in this it differs from the *Pea,* which has a triangular ſtyle keeled above: both genera have the two upper diviſions of the calyx ſhorter than the other three, and in other reſpects are very nearly allied. Some ſpecies of *Lathyrus* have one flower only on a peduncle: of theſe we have two wild ones; one with yellow flowers, ſupporting itſelf among the corn by leafleſs tendrils, and having broad ſtipules ſhaped like the head of an arrow: the other with crimſon flowers, long narrow leaves difficult to be diſtinguiſhed from the graſs among which it grows, and ſmall, ſubulate or awled ſtipules. The firſt is called *Yellow Vetchling* (*r*); the ſecond, *Crimſon Graſs Vetch* (*s*). *Sweet Scented Pea* (*t*), with ſome few others, has two flowers on every peduncle; each tendril has a pair of oblong ovate leaves, and the legumes are rough. The banner of the corol is dark purple, the keel and wings light blue: but there are varieties, one all white, and another with a pink banner, wings of a pale bluſh, and a white keel; this is called *Painted Lady Pea*. *Tangier Pea* (*u*), another of the *biflorous* ſection, has the two leaves alternate, lance-ſhaped and ſmooth; the ſtipules moon-ſhaped. The flowers grow on ſhort peduncles; have a purple banner, with wings and

(*r*) Lathyrus Aphaca *Lin.*
(*s*) Lathyrus Niſſolia *Lin.*
(*t*) Lathyrus odoratus *Lin.*
(*u*) Lathyrus tingitanus *Lin.*

keel of a bright red, and are ſucceeded by long jointed pods. *Everlaſting Pea* (*v*) is of the laſt diviſion, having many flowers produced on one peduncle: this has alſo conjugate leaves, that is, growing in pairs, furniſhed with a tendril or claſper; the form of the leaves is elliptic or oval; and the ſtems, which climb very high, have membranaceous wings on each ſide between the joints; the flowers are red. There is a variety of this in the gardens, with broader leaves, larger and deeper coloured flowers. There is another ſort not very different from this (*w*), having ſword-ſhaped leaves: and a third (*x*), growing in woods, bogs and wet meadows, which has many-leaved tendrils, and lance-ſhaped ſtipules: the lobes are ſix; and there are from three to ſix flowers on each peduncle; the corol is blue, with the greateſt part of the wings and keel white. One ſpecies of this ſection (*xx*), with yellow flowers, two-leaved tendrils which are extremely ſimple, and lance-ſhaped leaves, is very common in paſtures, hedges and woods.

Vetch or *Tare* is ſufficiently diſtinguiſhed by having a ſtigma tranſverſely bearded on the under ſide. The ſpecies, which are eighteen in number, may be ranged under

(*v*) Lathyrus latifolius *Lin.*
(*w*) Lathyrus ſylveſtris *Lin.*
(*x*) Lathyrus paluſtris *Lin.*
(*xx*) Lathyrus pratenſis *Lin.*

two diviſions, the firſt comprehending ſuch as have flowers in bunches on peduncles; the ſecond, thoſe which are axilliary, or have the flowers ſitting almoſt cloſe to the ſtem, and coming out from the angle which the leaves form with it. Of the firſt diviſion we have the *Tufted* (*y*) and *Wood Vetch* (*z*) wild; both having flowers in bunches many together, but in the firſt imbricate; in this alſo the lobes or component leaves are lance-ſhaped and pubeſcent, and the ſtipules entire: in the ſecond, the lobes are oval, and the ſtipules ſlightly toothed. The cultivated, and ſeveral wild ſorts are of the ſecond diviſion. The firſt (*a*) has erect, ſeſſile legumes, moſtly two together; the leaves are retuſe, and the ſtipules blotched. Of the others, *Spring Vetch* (*b*), which is very nearly related to the former, has however the legumes generally ſingle; the lower lobes retuſe, the upper ones narrow, and almoſt linear; the lobes are from four to ten; and the ſtipules are ſpotted, as in the former. *Buſh Vetch* (*c*) has about four erect legumes growing together on ſhort pedicles: the lobes of the leaves are ovate, and quite entire; the ſize of the

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(*y*) Vicia Cracca *Lin.*
(*z*) Vicia ſylvatica *Lin.*
(*a*) Vicia ſativa *Lin.*
(*b*) Vicia lathyroides *Hudſ.*
(*c*) Vicia dumetorum *Lin.*

lobes decreaſes towards the end of the leaf: it ramps in hedges. The *Bean* (*d*) is placed by Linnæus in the Vetch genus; and very juſtly, ſince it agrees with them in the characters of the fructification, and differs only in having a ſtouter ſtalk that ſupports itſelf, and therefore is not furniſhed with tendrils. Its native place of growth is ſuppoſed to be not far from the Caſpian Sea, on the borders of Perſia. All the different ſorts of Bean, are in reality but varieties from the ſame original ſtock: you underſtand me to ſpeak of Beans properly ſo called, in excluſion of Kidney Beans and others, which are not merely ſpecifically different, but alſo of another genus.

Of the ſame ſection, with pubeſcent ſtigmas, is a genus of well known ſhrubs called *Colutea:* diſtinguiſhed by their quinquefid calyx; and inflated legume, opening from the baſe, by the upper ſuture; the Engliſh name of *Bladder-Sena* is taken from the latter character. *Common Bladder-Sena* (*e*) has an arboreſcent ſtem, and inverſely hearted leaves. It grows 12 or 14 feet high; its winged leaves have four or five pair of grayiſh lobes; the flowers come out from the *alæ*, two or three together on ſlender peduncles; they are yellow with a dark-

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(*d*) Vicia Faba *Lin.*

(*e*) Colutea arboreſcens *Lin.*

coloured mark on the banner. This grows wild in the ſouthern countries of Europe. There is another, which comes from the Eaſt, and has flowers like this, only of a brighter yellow; differing in being a much lower ſhrub, and in having nine pair of ſmall oval, entire lobes to each leaf. A third, about the ſame height with the ſecond, but with branches ſtill more ſlender, comes from the ſame country: the leaves of this have five or ſix pair of ſmall heart-ſhaped lobes; the flowers are ſmaller, and of a dark red marked with yellow. It is a doubt whether theſe be ſpecifically different from the firſt: there is however one from Æthiopia, with ſcarlet flowers; which is very diſtinct (*f*): for it is a low, weak ſhrub, with leaves compoſed of ten or twelve pair of oblong-ovate, hoary lobes; the flowers are long, owing to the length of the keel, for the banner is ſhorter than that, and the wings are minute. You will eaſily ſuppoſe from its country, that it cannot ſtand the cold of a ſevere winter with us; it does not ſhrink however from a mild one, in a dry ſoil and warm ſituation. There is alſo an herbaceous ſpecies (*g*), with ſmooth linear lobes to the leaves; but this is an annual plant of

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(*f*) Colutea fruteſcens *Lin.*

(*g*) Colutea herbacea *Lin.*

little beauty, and therefore rarely cultivated.

There are ſeveral other ſhrubs of the Pea-bloom tribe; as the different ſpecies of *Cytiſus*, of which *Laburnum* (*h*) is one. This is known by yellow flowers hanging in large ſimple racemes, and three oblong-ovate lobes to the leaves. There is a variety with narrower leaves, and longer bunches of flowers, more common in ſhrubberies than the firſt, which is a larger tree and comes to excellent timber; but this making a better appearance when in flower, is preferred in ornamental plantations. *Seſſile-leaved Cytiſus* (*i*), vulgarly called *Cytiſus ſecundus Cluſii*, has the flowers in ſhort, erect racemes, at the ends of the branches; each flower has a little triple bracte at the baſe of the calyx; the leaves on the flowering branches are ſeſſile, but the others are petiolate. The flowers are of a bright yellow, and the pods are ſhort, broad and black. *Evergreen Cytiſus* (*k*) has the flowers coming out ſingly from the ſide of the ſtalk, with very hairy, trifid, obtuſe, oblong, ſwelling calyxes; the ſtalks extremely hairy; the leaves alſo hairy, eſpecially underneath. The flowers are pale yellow; and the pods long, narrow

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(*h*) Cytiſus Laburnum *Lin.*
(*i*) Cytiſus ſeſſilifolius *Lin.*
(*k*) Cytiſus hirſutus *Lin.*

and rough. All theſe, and the reſt of the ſpecies, agree in a two-lipped calyx, the upper lip bifid, the lower three-toothed; and a legume attenuated at the baſe; and pedicled, with ſeveral ſeeds in it. The leaves are ternate.

Robinia has a quadrifid calyx; an expanding, reflex, roundiſh banner; and a gibbous, elongate legume, containing ſeveral ſeeds. The tree which you admire for its long racemes of ſweet-ſmelling white flowers, hanging down like thoſe of Laburnum, is of this genus: I mean the *Baſtard Acacia* (*l*), called in North America, its native country, *Locuſt-tree*. The leaves are pinnate, conſiſting of eight or ten pair of oval lobes terminated by an odd one; all entire, and ſitting cloſe to the mid-rib: the ſtipules are armed with ſtrong, crooked thorns: and the flowers come out ſingly, or only one on a pedicle in the racemes. The *Caragana* (*m*), a Siberian ſhrub, has leaves abruptly pinnate, that is, winged not terminated by an odd lobe, or compoſed of four or five pair of oval lobes only: this has no ſpines, and the yellow flowers come out ſingly from the *alæ*. There are ſeveral other trees and ſhrubs of this genus; but theſe are the moſt known.

(*l*) Robinia Pſeudacacia *Lin.*
(*m*) Robinia Caragana *Lin.*

Coronilla is another genus of ſhrubs, comprehending however ſome herbaceous plants. They all agree in a two-lipped calyx; the upper lip two-toothed, the lower having three little teeth; the ſuperior teeth conjoined; in a banner ſcarcely longer than the wings; and in a very long, ſtraight legume, contracted between the ſeeds, and inſtead of opening by the ſutures, falling off in joints. —*Scorpion Sena* (*n*) is a ſpecies of this genus very common among ſhrubs: it is immediately known, by having the tails of its yellow corols three times as long as the calyx; two or three flowers come out together upon long peduncles from the ſides of the branches, which are ſlender and angular: the leaves are pinnate, and compoſed of three pair of lobes terminated by an odd one: the legumes are long, ſlender, taper and pendulous; the ſeeds cylindric. There are ſeveral beautiful ſhrubs of this genus, but too tender to bear the open air in our climate.

The plants from which Indigo is made (*o*), are of this Claſs; and many of the kindred genera reſemble them in quality as well as outward form and character. Scorpion Sena in particular, it is ſaid, will yield a dye nearly equal to Indigo, if the leaves are fermented in a vat in the ſame manner as is

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(*n*) Coronilla Emerus *Lin.*

(*o*) Indigofera *Lin.*

practiſed with thoſe plants; and you remember complaining perhaps, that the yellow flowers of the Lotus would turn blue in drying unleſs you took care to keep them ſeparate from other plants, and to change them often.

Liquorice is alſo of the ſame Claſs: it has a two-lipped calyx, with the upper lip divided into three parts, and the lower abſolutely ſimple and undivided; the legume is ovate and compreſſed, with very few kidney-ſhaped ſeeds. The ſpecies which is cultivated for the ſake of its roots (*p*), has ſmooth legumes, no ſtipules, and pinnate leaves conſiſting of four or five pair of lobes, terminated by an odd one, which is petiolate. It is a lofty plant for an herbaceous one, the ſtalks being from four to five feet high: the flowers come out in erect ſpikes from the *alæ*, and are pale blue.

Hedyſarum is a moſt numerous genus, containing no fewer than 59 ſpecies, all however conſpiring in having the keel tranſverſely obtuſe, and the legume jointed, with one ſeed in each joint. The genus is ſubdivided into four ſections, from the leaves; which in the firſt are ſimple; in the ſecond, conjugate; in the third, ternate; and in the fourth, pinnate. I ſhall preſent you only two ſpecies, and they of the laſt ſection.

(*p*) Glycyrrhiza glabra *Lin.*

One tranſplanted from Italy into the gardens; and the other from a wild ſtate to a cultivated one. The firſt is the *French Honeyſuckle* (*q*), which is diſtinguiſhed from the reſt by a diffuſed ſtalk, and by its jointed, prickly, naked, ſtraight legumes; its pinnate leaves point it out to be of the fourth ſection; they have five or ſix pair of lobes, terminated by an odd one; and from their baſe comes out a long peduncle, ſuſtaining ſpikes of beautiful red flowers. The other is the *Saint-foin* (*r*); the characters of which are an elongated ſtem; the wings of the corol equalling the calyx, and one-ſeeded prickly legumes: this has alſo, of courſe, pinnate leaves. It adorns the chalky hills with its beautiful ſpikes of red flowers; and contributes largely among many others of this Claſs to feeding of cattle. For this the *Trefoils* are moſt juſtly celebrated; there are 45 ſpecies of them, all having the flowers growing in a head; and the legume very ſhort, ſcarcely emerging from the calyx, not opening, but falling off entire, and containing but one, or at moſt two ſeeds. Though this be a genus eaſily diſtinguiſhed by its habit, yet the characters are by no means conſtant, and perhaps there is not one common to all the ſpecies. *White Trefoil*, com-

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(*q*) Hedyſarum coronarium *Lin.*
(*r*) Hedyſarum Onobrychis *Lin.*

monly called *Dutch Clover* (*s*), has a creeping, perennial ſtem; the heads umbelled; and the legumes covered and four-ſeeded. *Purple Trefoil*, *Honeyſuckle Trefoil*, or *Red Clover* (*t*) has the flowers growing in globular ſubvillous ſpikes, girt with oppoſite membranous ſtipules; and the corols all of one petal. There are many wild ſpecies of this genus; but the Yellow Trefoil, cultivated under this name, or that of *Noneſuch*, is of another genus, as we ſhall ſee preſently.

Lotus has a tubular calyx; the wings of the corol clapping cloſe together upwards longitudinally; and an upright cylindric legume. The wild ſpecies is called *common Bird's-foot Trefoil* (*u*), and is diſtinguiſhed by its decumbent ſtems, many flowers growing together in depreſſed heads; and exactly cylindric, ſpreading legumes. The corols are of a bright yellow.

Lucerne (*v*) is of the genus *Medicago*, the character of which is that the keel of the corol bends down from the banner, and that the legume is flatted, and ſpiral or wreathed like the ſhell of a ſnail. The ſpecific character is this—the ſtem is erect and ſmooth; the flowers grow in a raceme, and the legumes are contorted: the colour of the co-

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(*s*) Trifolium repens *Lin.*

(*t*) Trifolium pratenſe *Lin.*

(*u*) Lotus corniculatus *Lin.*

(*v*) Medicago ſativa *Lin.*

rols is blue. The ſpecies cultivated under the name of *Trefoil* or *Noneſuch* (*w*) has the ſtems procumbent; the flowers in oval ſpikes; and the legumes kidney-form, with one ſeed only in each: the corols are ſmall and yellow. In a cultivated ſtate the ſtems draw each other up, and loſe in great meaſure their natural procumbency, as does alſo *Bird's-foot Trefoil*, when it has other plants about it, as in graſs-fields, &c. There is a ſpecies of *Medicago* called *polymorphous* or *many-form* (*x*), from the variety of appearances it puts on, or from the change of figure in the pod. We have one variety very common wild (*y*), called *Heart-Clover* from the form of the leaves, which are alſo generally ſpotted: each head conſiſts of four or five little yellow flowers; the legumes are globoſe, ſpiral, and covered with very diverging ſpines: and in the garden you have the vegetable *Snails* (*z*), with large, ſpiral, globoſe legumes, naked, or not covered with ſpines; and the *Hedgehogs* (*a*), whoſe legumes are cloſely armed with long ſpines pointing every way. Theſe all have the ſtem diffuſe; the ſtipules toothed, and the legumes ſpiral. This Claſs has alſo its ve-

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(*w*) Medicago lupulina *Lin.*
(*x*) Medicago polymorpha *Lin.*
(*y*) Medicago polymorpha arabica *Lin.*
(*z*) Med. polym. ſcutellata *Lin.*
(*a*) Med. polym. intertexta.

getable *Caterpillars*, but they are of another genus (*b*).

I fear you will think I have already made this letter too long. However, as it may be ſome time before you hear from me again; as the next Claſs is a very ſmall one, and completes the ſet of plants with united filaments, I will treſpaſs on your patience whilſt I go through it.

The Claſs *Polyadelphia*, then, comprehends all ſuch flowers, as have the filaments united at bottom into more than two parcels. The filaments are in bunches, or pencilled, as one might call it, ſince they are collected into bodies reſembling a camel's hair pencil. If you were not to attend to this character, you might eaſily ſuppoſe theſe plants to belong to the Claſs *Polyandria*, for they have no ſtriking appearance, like the pulſe tribe and ſome others, announcing them immediately to range under this Claſs.

There are four Orders, taken from the ſtamens, and of theſe there is only one genus in three of them. *Chocolate* (*c*) is in the firſt, *Pentandria*; a genus called *Monſonia* in the ſecond; *Citron* comprehending *Oranges* and *Lemons* in the third; and eight genera in the fourth. The whole number of ſpecies is only 65.

The beautiful, odoriferous, well known,

(*b*) Scorpiurus.

(*c*) Theobroma Cacao *Lin.*

and deſervedly eſteemed genus of *Citrus* has theſe characters—a ſmall calyx five-toothed at top; a corol of five oblong petals; about twenty ſtamens, placed cylindrically about the germ, with the filaments connected rather ſlightly, ſometimes into more, ſometimes into fewer parcels; one piſtil; and for a fruit, a Berry generally nine-celled, with a bladdery pulp, in which the ſeeds are lodged.

You will have pleaſure in examining at leiſure the three elegant ſpecies of this genus, and in regaling your ſenſes, whilſt your mind imbibes inſtruction. When they are in fruit, you diſtinguiſh them immediately; but when they are not, you will find that the *Citron* (*d*) has the petioles linear or all of a ſize, like moſt other petioles; whereas the *Orange*, *Lemon* and *Shaddock*, have the petioles winged, in ſhape of a heart; ſo that the main leaf ſeems to grow out of a ſmaller one. Linnæus makes the *Orange* and *Lemon* (*e*) to be of one ſpecies, and to be diſtinguiſhed by pointed leaves from the *Shaddock* (*f*) which has them obtuſe, and emarginate or notched at the end: not to mention the great ſize of the fruit, the flowers of this grow more in racemes, which are alſo

(*d*) Citrus Medica *Lin.*
(*e*) Citrus Aurantium *Lin.*
(*f*) Citrus decumanus *Lin.*

a little nappy or woolly. I dare preſume that you are by this time ſo great an adept in Botany, as readily to admit, in ſpite of the information of your taſte to the contrary, that the Seville and China Oranges may be varieties of the ſame ſpecies, owing all their difference to climate. Neither perhaps do you find much difficulty in perſuading yourſelf, that the large and generous Lemon may not be ſpecifically different from the little, round, ſour Lime; notwithſtanding ſome little difference in the leaves, and the ſpines on the branches of the latter. But I much doubt whether you will be able to perſuade your fair daughter to admit that the auſtere, long, pale Lemon, is not a ſpecies totally diſtinct from the round, deep-coloured Orange, the flavour of whoſe juice ſhe enjoys with ſo much delight. I will conſent that ſhe ſhould enjoy her incredulity, at leaſt if ſhe can diſtinguiſh theſe trees when they are deſtitute of fruit. The poſition of the ſtamens informs you that this genus is of the order *Icoſandria*.

The genus *Hypericum*, in the laſt Order (*Polyandria*), of this Claſs, has many more ſpecies, than all the other genera put together. Several of them are wild, and ſeveral others are commonly cultivated among ſhrubs; they are not however all ſhrubs, for many ſpecies are herbaceous. All plants do not exhibit the claſſical mark, in this or any other claſs, with equal evidence; in this genus the numerous ſtamens will eaſily ſeparate from the receptacle in pencils or parcels, and thus evidently ſhow what is their proper place in the ſyſtem. Being thus certified that your plant does not belong to the Claſs *Polyandria*, but to this; you will eaſily diſtinguiſh it from its congeners, by its five-parted calyx including the germ; by its corol of five petals; by the abundance of ſtamens, uſually forming five ſquadrons; and by the ſeed-veſſel being a capſule, divided into as many cells as there are ſtyles to the flower: theſe are either one, two, three or five in number; and hence a ſubordinate diviſion of the genus into four ſections: there is however only one ſpecies with one ſtyle, and there are only two ſpecies with two; the far greater number have three: and among theſe are all the European ones.

Common Saint-John's wort (g) has two characters ſo remarkable that it cannot well be miſtaken, as ſoon as they are underſtood: for it has an *ancipital* or two-edged ſtem, that is, roundiſh or a little flatted, and running out longitudinally into two little edges or membranes oppoſite to each other: and its obtuſe leaves are punctured all over their ſurface, ſo as to appear, when held up againſt the light, as if they had been pricked with a pin. Another wild ſort not near ſo common, growing in moiſt hedges and woods, and called *Saint-Peter's wort* (*h*) has ſquare ſtalks; it is about the ſame ſize with the other, but does not branch ſo much; the leaves are ſhorter and broader, and have none of the pellucid dots which are ſo remarkable in the former. *Trailing Saint John's wort* (*i*) is a pretty little plant, found on dry paſtures and heaths: it has two-edged, proſtrate, filiform ſtems; ſmooth leaves; and axillary, ſolitary flowers. *Upright Saint-John's wort* (*k*) is an elegant ſpecies, growing in woods and heaths; with columnar ſtems; ſtem-claſping, ſmooth, heart-ſhaped leaves; and ſerrated calyxes with the teeth glandular.

(g) Hypericum perforatum *Lin.*

The two moſt common ſorts, cultivated among other ſhrubs, are the *ſtinking ſhrubby* (*l*) and *Canary* (*m*) *Saint-John's worts.* They have both a rank ſmell, reſembling that of a goat, which however in ſome circumſtances, and at certain diſtances, ſeems to be ſweet, at leaſt to ſome perſons; both alſo have three piſtils: but the firſt is a much

(*h*) Hypericum quadrangulum *Lin.*
(*i*) Hypericum humifuſum *Lin.*
(*k*) Hypericum pulchrum *Lin.*
(*l*) Hypericum hircinum *Lin.*
(*m*) Hypericum canarienſe *Lin.*

lower plant, and has the ſtamens longer than the corol; whereas in the ſecond they are ſhorter. *Garden Tutſan* (*n*) is evidently of this genus: it is one of thoſe which have five piſtils, the ſtems are low, ſimple, herbaceous and quadrangular; the leaves ſmooth and quite entire: the roots creep extremely, and the flowers are very large. *Wild Tutſan*, or *Tutſan Saint-John's wort* (*o*), called alſo *Park-leaves*, has a ſhrubby two-edged ſtem; three piſtils; and a berried fruit, or ſoft, coloured pericarp: the flowers of this are ſmall, and the ſtamens extend beyond the corols. It grows wild in woods, and ſometimes in moiſt hedges. Of the more rare and tender ſorts, the *Majorca Saint-John's wort (p)* is very diſtinguiſhable by the ſcars all over the ſlender red branches; the leaves alſo are *repand* or waved on their edges, have ſmall protuberancies on their under ſurface, and at the baſe embrace the ſtalk; the flowers are large, with the ſtamens a little ſhorter than the corol, and five piſtils. Laſtly, *Chineſe Hypericum* (*q*), which ſtands alone, as having one piſtil only, has a ſhrubby ſtem, coloured calyxes, ſtamens longer than the corol, and is one of the moſt

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(*n*) Hypericum Aſcyron *Lin.*
(*o*) Hypericum Androſæmum *Lin.*
(*p*) Hypericum balearicum *Lin.*
(*q*) Hypericum monogynum *Lin.*

beautiful of this genus, ſo gay with its yellow corols, and abundant crop of ſtamens.

With this large harveſt, I leave you, dear Couſin, 'till I ſhall have found leiſure to prepare the extenſive and moſt difficult tribe of Compound Flowers, for your inſpection.

LETTER XXVI.

Auguſt the 24th, 1776.

THOUGH this letter, dear Couſin, will arrive late in the ſeaſon, yet it will be in time for you to examine the far greater part of the Claſs *Syngeneſia*, or Tribe of Compound flowers, which blow chiefly in the autumn. You are well aware that the eſſential character of this Claſs, is the union of the anthers. You are perfect miſtreſs of the ſtructure of a compound flower, and of the different florets that compoſe it (*r*). And laſtly, the ſeveral Orders into which the Claſs is divided are familiar to you, and the foundation of them well underſtood (*s*). Very little therefore remains to premiſe, before we proceed to the examination of the genera and ſpecies.

This is by much the moſt numerous of the Natural Claſſes (*t*), and therefore it ſhould in all probability be more difficult to find ſufficient generic and ſpecific diſtinctions here than in any other: ſuch however

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(*r*) See Letter VI.

(*s*) See Letter X.

(*t*) The number of genera being 116, and of ſpecies 1257: whereas the Claſs *Didynamia* has but 102 genera and 643 ſpecies; and the Claſs *Diadelphia* only 57 genera and 695 ſpecies.

has been the ſagacity and induſtry of Linnæus, that I hope you will not find any great difficulty, even in the two firſt Orders, which contain above two thirds of all the genera.

To facilitate the inveſtigation, in the firſt Order, *Polygamia Æqualis*, it is ſubdivided into three battalions, eaſily diſtinguiſhed by the moſt obvious characters. The firſt contains the flowers compoſed wholly of ligulate florets, which are the Semifloſculous flowers of Tournefort: the ſecond contains the *capitate* or headed flowers: and the third, the *diſcoid* flowers. So that there are no radiate flowers in this Order: the flowers of the firſt ſection are wholly made up of ſuch florets as compoſe the ray of theſe: in the two other ſections there are none of theſe ligulate corols or ſemiflorets, but the compound flower is wholly made up of tubulous corols, or florets properly ſo called: in the ſecond ſection theſe are long, and the calyx bulges out at bottom, as in the thiſtles; in the third, the flowers reſemble a daiſy or other radiate flower, with the ray pulled off.

The calyx, the receptacle, and the crown of the ſeed will in general be found ſufficient to furniſh the generic diſtinctions in this Order (*u*).

Thus

(*u*) The calyx is ſingle, or ſimple in *Seriola*, *Geropogon*, *Andryala*, *Tragopogon:* calycled, or furniſhed with a ſe-

Thus *Tragopogon* or *Goat's-beard* is known by its ſimple calyx, naked receptacle, and feathered ſtipitate down: and theſe three circumſtances are ſufficient to diſtinguiſh this genus from all others; provided you have firſt aſſured yourſelf, by the rules already laid down, that your flower is of the compound tribe, that each floſcule has the anthers united into a cylinder, which the piſtil, terminated by two revolute ſtigmas, perforates; and that the corols are all ligulate: for thus it is that you come at the Claſs, Order and Section. I cannot ſuppoſe that you have any difficulty in diſtinguiſhing a natural Compound flower, from a Double one, the creature of art and culture, though the ſimilarity may miſlead thoſe who are not accuſtomed to obſervation; becauſe I am certain that if you have the leaſt doubt, you

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a ſecond ſet of leaflets at the baſe in *Cichoreum*, *Picris*, *Crepis*, *Chondrilla*, *Prenanthes*, *Lapſana*, *Hyoſeris*; in the reſt imbricate. The Receptacle is villous in *Scolymus*, *Cichoreum*, *Catananche*, *Seriola*, *Hypochæris*, *Geropogon*; in the reſt it is naked, that is, has neither hairs nor chaffs between the floſcules. *Scolymus*, and *Lapſana* have no *pappus* or down: in *Seriola*, *Andryala*, *Crepis*, *Prenanthes*, *Lactuca*, *Hieracium*, *Sonchus*, the down is ſimple; in *Hypochæris*, *Geropogon*, *Tragopogon*, *Picris*, *Leontodon*, *Scorzonera*, *Chondrilla* it is feathered; in *Cichoreum* the crown of the ſeed is five-toothed, in *Catananche* five-awned, in *Hyoſeris* crowned with a calycle. In ſome genera this down ſits cloſe to the ſeed, in others it is *ſtiped* or *ſtipitate*; that is, has a ſtem interpoſed between it and the ſeed.

will pull out a floſcule, in order to ſee whether it has a ſeed, ſtamens and piſtil, or is only a mere flat petal. But to return to our plant.—*Yellow* or *Common Goat's-beard* (*v*), which grows wild among the graſs in meadows, is diſtinguiſhed by entire upright leaves, and by the ſegments of the calyx at leaſt equalling in length the outer floſcules. Towards noon you will not eaſily find this plant, becauſe the flowers are then always cloſed: after the flower is paſt, *Goat's-beard* is very apparent, on account of the large globe formed by the down of the ſeeds, 'till the wind has at length torn them from the receptacle, and wafted them ſeparately to diſtant places.

Salſafy (*w*), which your gardener will furniſh you with from the kitchen garden, has the ſegments of the calyx much longer than the floſcules, and the peduncles ſwell out remarkably under the flower; which is large, and of a fine blue.

Another plant of this tribe which you may alſo have from the kitchen garden, is the *Scorzonera*, of a genus nearly allied to the laſt; agreeing with it in having a naked receptacle and a feathered ſtipitate down, but differing from it by an imbricate calyx, with the ſcales *ſcarioſe*, or black as if parched

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(*v*) Tragopogon pratenſe *Lin.*

(*w*) Tragopogon porrifolium *Lin.*

ed on the edge. The cultivated ſpecies (*x*) has a branching ſtem, and entire, ſtem-claſping leaves, ſlightly ſawed on their edges: the flowers are of a bright yellow.

Sowthiſtle and *Lettuce* agree in a naked receptacle, an imbricate calyx, and a ſimple down to the ſeed. But in the firſt the calyx is gibbous, or ſwelling at the baſe; in the ſecond it is cylindric, with membranous edges: the firſt has a ſeſſile down; in the ſecond it is ſtipitate, and the ſeeds are poliſhed. You will always find it uſeful, where you can, thus to bring together and compare plants of nearly allied genera, in order to conſider well their ſimilitudes and differences, and to give you a readineſs in making thoſe minute but important diſtinctions, ſo neceſſary to diſcrimination in natural tribes, wherein all ſeems alike to the untutored eye, as the ſheep of the flock to the ordinary paſſenger; whereas the Shepherd knows each by its proper marks, and calls them all by their names.

Of the *Sowthiſtle (y)*, that vulgar weed of the kitchen garden, there are many varieties; the rough and the ſmooth; with lacerate leaves and ſimple ones, &c. which I mention, only that you may not be led to ſearch for them, as diſtinct ſpecies; in rea-

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(*x*) Scorzonera hiſpanica *Lin.*
(*y*) Sonchus oleraceus *Lin.*

lity theſe differences are owing merely to accident and ſituation.

Hieracium or *Hawkweed* is a numerous genus of this Order and Section: the calyx is ovate and imbricate, the receptacle naked, and the down ſimple and ſeſſile. There are many ſpecies wild in this country; one (*z*), which is a large plant, on walls and banks and in woods; with a branching ſtem, the radical leaves oval and toothed, and a ſmaller leaf on the ſtalk: and another, very common indeed in dry paſtures, called *Mouſe-ear Hawkweed* (*a*), from the long hairs upon the leaves, which are ovate, and abſolutely entire; this ſort throws out runners, and the flowers come out ſingly on naked ſtalks. There are other ſpecies, vulgarly called *Hawkweeds*, which range under other genera, as the *Crepis*, which differs from *Hieracium*, in having the calyx only calycled, with deciduous ſcales.

I ſhall conclude the firſt ſection with *Succory* or *Endive*; which has the calyx calycled, a few chaffs between the floſcules on the receptacle, and the crown of the ſeed moſtly five-toothed and obſcurely hairy. *Wild Succory* (*b*) has runcinate leaves, and generally two ſeſſile flowers coming out together:

(*z*) Hieracium murorum *Lin.*

(*a*) Hieracium Piloſella *Lin.*

(*b*) Cichoreum Intybus *Lin.*

Endive (*c*) has ſolitary, peduncled flowers, and entire leaves, only notched about the edge. Both have flowers of a fine blue; but the firſt is perennial, and the ſecond only biennial. Curled Endive, though differing ſo remarkably from its parent in the leaves, is but a variety of the laſt.

The greater part of the ſecond ſection, in this firſt Order of the nineteenth Claſs, is occupied by the Thiſtles, a moſt untractable genus, not at all adapted to the delicate fingers of our lovely *Flora*. The calyx is all imbricate with thorny ſcales; and how will ſhe tear this aſunder, to diſcover that the receptacle has hairs between the ſeeds: yet theſe two circumſtances form the character of the genus; and ſhe muſt obſerve that there are ſome plants commonly called *Thiſtles*, which are not of the genus *Carduus*. For inſtance, the *Common Way-Thiſtle* (*d*) not having ſpines to the ſcales of the calyx, which alſo is cylindric in ſhape, whereas in the *Cardui* it bulges out at bottom, and the receptacle being naked, is not a *Carduus* in Linnæus's idea, but a *Serratula*. So likewiſe *Cotton-Thiſtle* (*e*) having a honey-combed receptacle, is ſeparated on account of that circumſtance. Indeed the genus would

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(*c*) Cichoreum Endivia *Lin.*
(*d*) Serratula arvenſis *Lin.*
(*e*) Onopordon Acanthium *Lin.*

have been too vaſt and unmanageable, without an attention to theſe marks, which might ſometimes have appeared otherwiſe too minute. You have perhaps even heard it ſaid that the *Artichoke (f)* is nothing but a Thiſtle. It differs indeed very little; having a hairy receptacle, only the hairs being ſtiffer, it may be called briſtly; and the ſtructure of the down being the ſame: they differ principally in the calyx, for the ſcales in the Artichoke are *ſcarioſe* or ragged, fleſhy, and terminated by a channelled appendicle, emarginate and pointed—a character which you may examine at your leiſure at table. If you would ſpeculate on the blue flowers; which being ſo large, will give a good idea of florets; at the ſame time that it is alſo an excellent inſtance of the Order *Polygamia-Æqualis*, and the *Capitate* or *Headed* ſection of it; you muſt prevail on your gardener to let ſome heads ſtand long after the time that they ſhould be cut for the table.

The *Burdock*, whoſe heads ſometimes faſten themſelves to your clothes as you paſs, is in the ſame diviſion with the Thiſtles: the globoſe form of the calyx, together with the hooked tops of the ſcales which compoſe it, are the eſſential characters of the genus. The common wild ſpecies (g) has very large woolly heart-ſhaped leaves, petiolate and unarmed.

(f) Cynara Scolymus *Lin.*
(g) Arctium Lappa *Lin.*

Of the third ſection, with *Diſcoid*, or as ſome call them, *naked diſcous* flowers, few are at hand. The banks of rivers and ditches will furniſh a ſpecies of *Eupatorium* (*h*), a large plant with digitate leaves: uſually there are three lobes to each leaf, which are hairy and ſharply ſerrate, the middle one the largeſt; ſometimes the ſide lobes are wholly wanting, and the leaf becomes ſimple: the ſtalks are lofty, rough and quadrangular; and bear large bunches of ſmall purple flowers on their tops, with about five florets in each calyx. The characters of the genus are an oblong, imbricate calyx, a naked receptacle; a feathered down, and a very long ſtyle, divided half way the length.

The ſame ſituations will produce you the *Bidens*; which has alſo an imbricate calyx: but the receptacle is chaffy; the corol is ſometimes furniſhed with one floret alternately radiant; and the ſeeds are crowned with two erect, rugged awns, which being hooked make the ſeeds adhere to any thing that comes near them. We have two wild ſpecies, the *trifid* (*i*), ſo called from its trifid leaves; with erect ſeeds, and leafy calyxes,

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(*h*) Eupatorium cannabinum *Lin.* Common Hemp-Agrimony.

(*i*) Bidens tripartita *Lin.* Water Hemp-Agrimony.

and the *nodding* (*k*), with lance-ſhaped, ſtem-claſping leaves, nodding flowers and erect ſeeds. The corols of both are yellow, but thoſe of the laſt, which is the leaſt common, are moſt ſpecious.

The ſecond Order of the Claſs Syngeneſia, entitled *Polygamia Superflua*, being ſcarcely leſs numerous than the firſt, is ſubdivided into two ſections, the firſt containing the diſcoid, and the ſecond, the radiate flowers: there is only one genus in this Order with ſemifloſculous flowers.

Of the firſt ſection, with diſcoid flowers, you have the *Tanſy*; which you find to have an imbricate, hemiſpheric calyx; the corols of the ray, or on the outſide trifid; the others quinquefid; the ſeeds naked, being only ſlightly edged; and the receptacle naked. Sometimes in this genus there are no imperfect flowers. Our *common Tanſy* (*l*), which not only the kitchen garden, but dry, upland paſtures will furniſh you with, has bipinnate, or twice-feathered leaves, which are gaſhed, and ſerrated about the edges.

Southernwood (*m*), the *Wormwoods* and *Mugwort* (*n*), all range under the genus *Artemiſia*; which has a calyx imbricate with rounded,

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(*k*) Bidens cernua *Lin.* Nodding Water Hemp-Agrimony.

(*l*) Tanacetum vulgare *Lin.*

(*m*) Artemiſia Abrotanum *Lin.*

(*n*) Artemiſia vulgaris *Lin.*

converging ſcales; naked ſeeds; and a receptacle either naked or with few hairs: the flowers have no ray whatever, but are ſtrictly diſcoid. *Southernwood* (*m*) is ſhrubby, erect, and has ſetaceous leaves, very much branched: there is a *field* or *wild Southernwood* (*o*) with procumbent, twiggy ſtems, and multifid, linear leaves. *Common (p)* and *Roman Wormwoods* and *Mugwort* (*n*) have erect herbaceous ſtems, and compound leaves. The *Common (p)* ſpecies has the leaves multifid, the flowers ſubglobular and pendulous, and the receptacle hairy. *Roman Wormwood* (*q*) has the leaves many-parted and downy underneath, the heads of flowers roundiſh and nodding as in the other; but the receptacle naked. *Mugwort* (*n*) has pinnatifid, flat, gaſhed leaves, downy underneath; the flowers are born in ſimple, recurved racemes, and have a ray of five flowers. *Common Sea Wormwood* (*r*) has procumbent ſtems; many-parted downy leaves, nodding racemes, and three flowers in the ray.

Gnaphalium, comprehending many wild *Cudweeds*, and the *Immortal* flowers, or *yellow* and *white Everlaſtings*; has an imbricate calyx, with the ſcales rounded, ſcarioſe and coloured; a naked receptacle; and feathered

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(*o*) Artemiſia campeſtris *Lin.*
(*p*) Artemiſia Abſinthium *Lin.*
(*q*) Artemiſia pontica *Lin.*
(*r*) Artemiſia maritima.

down. There are ſeveral ſpecies both of yellow and white Everlaſtings; the moſt known of the firſt, is common in Portugal, where they adorn their churches with the flowers, which are alſo ſent annually to England: it is ſuppoſed to have been brought originally from India (*s*): the leaves are linear-lanced and ſeſſile; the flowers are born in a compound corymb, on elongated peduncles; and the ſtem is ſubherbaceous. One of the latter (*t*) is very common in the gardens, and is originally of North America; this has leaves like the former, ſharp-pointed and alternate; the ſtems herbaceous and branched above, the flowers in corymbs with level tops. This has a very creeping root; and the ſtalks and leaves are woolly: the ſilvery calyxes, as well as the golden ones of the former, if gathered before they are too open, will continue in beauty many years.

Xeranthemum or *Eternal flower* has an imbricate calyx, with the inner ſcales membranaceous, ſhining, and forming a ſet of coloured rays to crown the flower; the receptacle is moſtly naked; and the down is either briſtly or feathered. *Annual Xeranthemum* (*u*) is an exception to the general

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(*s*) Gnaphalium orientale *Lin.*
(*t*) Gnaphalium margaritaceum *Lin.*
(*u*) Xeranthemum annuum *Lin.*

character, in having a chaffy receptacle; it is alſo the only one which has a down of five briſtles: it is herbaceous, has lance-ſhaped ſpreading leaves; the outſide florets have a ſimple ſtigma, with a naked ſeed; thoſe in the middle have a ſub-bifid ſtigma. The colour of the corol is either purple or white. There is a ſort from the Cape with yellow flowers (*v*).

The ſecond diviſion of this Order, with *Radiate* flowers, is much the largeſt. *Tuſſilago* or *Colt's-foot* has a cylindric calyx, with equal ſcales, from 15 to 20 in number, as long as the diſk of the flower, and a little membranous; a naked receptacle; and a ſimple or hairy down. *Common wild Colt's-foot* (*w*) has angulate leaves, rather heart-ſhaped, with ſlight indentations about the edges, underneath white; and one yellow flower on a ſcape, which is imbricate or covered with ſcales. *Butter-bur* (*x*) has vaſt leaves ſhaped much like thoſe of the *Colt's-foot*; many (from 10 to 20) purpliſh flowers, collected into an ovate thyrſe, on the top of a purpliſh ſcape ſet with ſcales of the ſame colour: there are ſometimes from 2 to 6 imperfect, white, ligulate florets, with ſcarcely any corol, among the others. You

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(*v*) Xeranthemum ſpecioſiſſimum.

(*w*) Tuſſilago Farfara *Lin.*

(*x*) Tuſſilago Petaſites *Lin.*

will not be able to examine all the ſpecific characters of theſe two plants at once; for the naked ſtem which bears the flowers, puſhes up alone very early in the ſpring; and the leaves do not ſucceed 'till the flowers are paſt.

Senecio or *Groundſel* is a very numerous genus *(y)*, having a cylindric calycled calyx, with the ſcales *ſphacelate* or ſeeming mortified at top; a naked receptacle; and a ſimple down. Moſt of the ſpecies have radiate flowers, eight of them however have not, and among theſe is the *Common Groundſel* (*z*), ſo vulgar a weed in kitchen gardens. *Stinking Groundſel* (*a*), a plant not very unlike this, has however radiate corols, with the ſemiflorets of the ray revolute; the ſcales of the calyx are looſe; and the leaves are pinnatifid and viſcid. This grows in hedgerows and on heaths, and is a much taller plant than the laſt.

Common Ragwort (*b*) has alſo radiate corols, with the ray however not revolute but expanding: the ſtem of this is erect; the leaves pinnatifid approaching to lyrate, with the diviſions a little jagged. This is very common by road-ſides and in paſtures. The

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(y) 57 ſpecies.

(*z*) Senecio vulgaris *Lin.*

(*a*) Senecio viſcoſus *Lin.*

(*b*) Senecio Jacobæa *Lin.*

gardens have a *purple African Groundſel* (*c*) from the Cape; an annual plant with a yellow diſk and purple rays: it agrees with Ragwort in having radiate corols with the ray expanding; the leaves are pinnatifid, equal and very ſpreading, with a thickened recurved margin; and the ſcales of the calyx are thinly ciliated. A ſingular plant of this genus came up one year in my garden, which I took at firſt to be a new ſpecies; but on more accurate examination, it proved to be a hybridous plant or mule, produced from this and the common Groundſel: it had the radiate flowers of the one, ſmall indeed and ſlightly tinged with purple, and the herb of the other: being annual, and producing no ſeed, this variety paſſed away with the ſeaſon.

The two genera of *Aſter* and *Golden-rod* furniſh abundance of flowers that enliven the autumnal ſeaſon, and continue 'till the ſeverity of froſt puts an end to them. They both agree in an imbricate calyx, a ſimple down, and a naked receptacle: but the inferior ſcales in the calyx of the *Aſter* are ſpreading, and have a ragged appearance; whereas in the *Golden-rod* they are cloſe: all the ſpecies alſo of the *Aſter* have more than ten ſemifloretss in the ray, but the *Golden-rods* have only about five or ſix remote ones. Some

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(*c*) Senecio elegans *Lin.*

of the *Aſters* are ſhrubby, but moſt of them are tall herbaceous plants, dying down to the ground at the approach of winter, and riſing again from the ſame root the enſuing ſpring: many are confounded under the vulgar title of *Michaelmas Daiſies*. The *Amellus*, or *purple Italian Starwort* (*d*), is one of the loweſt ſpecies, but has large purple flowers, growing in a corymb on naked peduncles, with the ſcales of the calyx obtuſe; the leaves are lance-ſhaped, obtuſe, rugged, entire about the edges, and marked underneath with three nerves. The greater part of the perennial American Aſters have ſcaly peduncles; ſome have entire, and others ſerrated leaves; hence a convenient ſubdiviſion of the genus: there are however ſome few ſpecies with ſerrated leaves and naked ſmooth peduncles. *Large-flowering* or *Cateſby's Starwort* (*e*), is one of the handſomeſt; the flowers being large and of a deep purple; the calyx is ragged; the peduncles are ſcaly, and ſuſtain only one flower; the leaves are quite entire, tongue-ſhaped, and claſp the ſtem. *Chineſe Aſter* (*f*) is an annual plant, with ovate, angulate leaves, toothed about the edge, and petiolate; the flowers terminate the branches, and have

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(*d*) Aſter Amellus *Lin.*
(*e*) Aſter grandiflorus *Lin.*
(*f*) Aſter chinenſis *Lin.*

ſpreading leafy calyxes. The variety of colour, and ſize of the corol, have made this ſpecies very generally cultivated: the frequent duplicity of them, will not induce you to miſtake a double radiate, for a natural ligulate flower; which to an unobſerving eye it perfectly reſembles. The ſalt-marſhes on the ſea-coaſt of Europe furniſhes one ſpecies, called *Sea-Starwort* (*g*): this has lance-ſhaped, entire, fleſhy, ſmooth leaves; the branches are unequal; and the flowers in a corymb.

Of the *Golden-rods* we have only one European ſpecies (*h*); unleſs we diſtinguiſh the *Welſh Golden-rod* (*i*), which ſeems but an humble variety. The ſtem is a little flexuoſe or winding; and the flowers grow in erect, crowded, panicled racemes. The Welſh variety has the leaves a little hoary underneath, and roundiſh cluſtered ſpikes at the top of the ſtalk, with larger flowers appearing earlier than the common ſort: in lofty ſituations and dry ſoils, a ſtem will ſometimes produce one flower only. North America has furniſhed abundance of ſpecies, whoſe golden racemes of flowers mix happily with the purple corymbs of the Aſters;

(*g*) Aſter Tripolium *Lin.*
(*h*) Solidago Virgaurea *Lin.*
(*i*) Solidago cambrica *Hudſ.*

and thus they jointly enliven plantations of ſhrubs in the latter ſeaſon.

Inula, of which *Elecampane* (*k*) is the leading ſpecies, has the following characters —a naked receptacle; a ſimple down; and the anthers ending at the baſe in two briſtles: this ſtructure of the anthers is *unique*—the cylinder is compoſed of five ſmaller, linear anthers, each ending in two briſtles, of the length of the filaments. The true *Elecampane* (*k*) is diſtinguiſhed by its large, ſtem-claſping, ovate, wrinkled leaves, downy underneath; and by the ovate form of the ſcales of the calyx. The ſtalks are three feet high, and divide towards the top into ſeveral ſmaller branches, each of which is terminated by one large yellow flower. The *Flea-banes middle* (*l*) and *leſs* (*m*) are of this genus; the firſt is common in moiſt meadows, and has ſtem-claſping, oblong leaves, hollowed next the petiole; a villous ſtem terminated by yellow flowers in panicles; and the ſcales of the calyx briſtly. The ſecond (*m*) has alſo ſtem-claſping leaves, but waved; proſtrate ſtems; and ſubglobular flowers, eaſily known by the ſhortneſs of the ray. The place of this is by road-ſides, and where water ſtands in winter.

(*k*) Inula Helenium *Lin.*

(*l*) Inula dyſenterica *Lin.*

(*m*) Inula pulicaria *Lin.*

Doronicum or *Leopard's-bane*, a wild plant of the Alps, and now common among the perennials of the garden, has the ſcales of the calyx in two rows, equal, and longer than the diſk; the ſeeds of the ray naked or deſtitute of down, thoſe of the diſk crowned with a ſimple down; the receptacle naked. The common ſpecies, above alluded to (*n*), has heart-ſhaped leaves, ſlightly indented about the edge, and obtuſe at the end; thoſe at the root petiolate, thoſe above ſtem-claſping. The ſtalks are channelled and hairy, near three feet high; theſe put out a few ſide branches, each of which is terminated by a large yellow flower. A ſecond ſpecies (*o*) has ovate, acute leaves, ſlightly indented; and alternate branches. A third (*p*) has a naked, ſimple ſtem ending in one flower: and theſe make up the whole genus.

Tagetes has a one-leafed, five-toothed, tubular calyx; five permanent florets to the ray; the ſeeds are crowned with five erect awns; and the receptacle is naked. *French* (*q*) and *African* (*r*) Marigolds, two of the gaudy annuals of the flower garden,

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(*n*) Doronicum pardalianches *Lin.*
(*o*) Doronicum plantagineum *Lin.*
(*p*) Doronicum Bellidiaſtrum *Lin.*
(*q*) Tagetes patula *Lin.*
(*r*) Tagetes erecta *Lin.*

are of this genus. The firſt is diſtinguiſhed by a ſubdivided ſpreading ſtem; the ſecond, by an erect, ſimple ſtem, with naked, one-flowered peduncles. Of both theſe, as you well know, there are many varieties in colour, from pale brimſtone to deep orange; and the more they deviate into duplicity, ſo much the more does your gardener value himſelf on his ſkill or good fortune.

Chryſanthemum, ſo named from its golden-coloured flowers, is known by its hemiſpheric, imbricate calyx, formed of cloſe ſcales, the inner ones gradually larger, and the inmoſt membranous or chaffy; there is no down to the ſeeds, but they are only edged or margined; the receptacle is naked. Some of the ſpecies are improperly termed *Chryſanthema*, having white rays to the flowers: of theſe we have an inſtance in the *Ox-eye Daiſy* (*s*), a plant common among ſtanding graſs in meadows, and having oblong, ſtem-claſping leaves, ſawed above, and toothed below. *Corn Marigold* (*t*), which is a weed among the corn in ſandy lands, has yellow rays, and ſtem-claſping leaves, jagged above, and toothed below; they are ſmooth, and of a glaucous hue. Leſt you ſhould think the colour of more

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(*s*) Chryſanthemum Leucanthemum *Lin.*

(*t*) Chryſanthemum ſegetum *Lin.*

importance than it really is, I will put you in mind, that the ſpecies ſo commonly cultivated in flower gardens, under the name of *Chryſanthemum creticum* (*u*), has both yellow and white rays: theſe flowers are eſteemed in proportion as they deviate from nature; but the plant may always be known, by the pinnate, gaſhed leaves, growing broader towards the end.

The three genera of *Matricaria*, *Cotula*, and *Anthemis* are nearly allied. The firſt has a hemiſpheric, imbricate calyx, with the marginal ſcales ſolid, and rather acute: the ſeeds have no down; and the receptacle is naked. The ſecond has a convex calyx; the florets of the diſk quadrifid, thoſe of the ray have only a germ with its ſtyle and ſtigmas, without any corol: there is no down, but the ſeed is margined; and the receptacle is naked, or nearly ſo. The third has a hemiſpheric calyx, with the ſcales nearly equal; more than five ſemiflorets in the ray; no down; and a chaffy receptacle. There are plants vulgarly known by the name of *Mayweed* or *Camomile*, in each genus. *Common Fever-few* (*v*) alſo is a ſpecies of *Matricaria*: the leaves are compound and flat, the lobes or diviſions are ovate and gaſhed, and the peduncles are branched: it

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(*u*) Chryſanthemum coronarium *Lin.*

(*v*) Matricaria Parthenium *Lin.*

grows upon banks, has a ſtrong, unpleaſant ſcent, the leaves are of a yellowiſh green, and the rays of the flower are white: admitted into gardens, it has generally double flowers. *Common* or *true Camomile* (*w*) is an *Anthemis*; and has compound pinnate leaves, the diviſions linear, acute, and a little villous. It ſometimes covers a conſiderable extent of ground on dry ſandy commons, trailing along, and putting out roots from the ſtalks; its agreeable odour betrays it as we tread upon it: that which is found in gardens, has uſually loſt all character by cultivation.

Achillea or *Milfoil* has an oblong-ovate, imbricate calyx; from 5 to 10 ſemiflorets in the ray; no down; and a chaffy receptacle. *Common wild Milfoil* or *Yarrow* (*x*) has bipinnate naked leaves, the diviſions of which are linear and indented; the ſtems are furrowed above. It is a vulgar plant in paſtures, and particularly by way ſides; for it ſeems to delight in being trod upon, and in ſuch places ſpreads itſelf abundantly. The uſual colour of the flower is white; but it ſometimes varies to a fine purple. Other foreign ſpecies are yellow.

The four remaining Orders of this Claſs, being much leſs numerous than the two

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(*w*) Anthemis nobilis *Lin.*

(*x*) Achillea Millefolium *Lin.*

which we have already examined, there is not the ſame occaſion for ſubdiviſions; and accordingly Linnæus has not made any. The third Order of *Fruſtraneous Polygamy* comprehends no more than ſeven genera, from which I ſhall ſelect two—*Helianthus*, and *Centaurea*. The firſt has an imbricate calyx, rather ſquarroſe, or having a ragged appearance from the ſpreading of the tips of the ſcales; a two-leaved or two-awned crown to the ſeeds; and a flat chaffy receptacle. Every ſpecies of this genus is a native of America alone, and on the diſcovery of the new world, ſome of them were vaunted as miracles of nature, though they are now become ſo common, as almoſt to be diſregarded. The *annual Sun-flower* (*y*) however it muſt be acknowledged is a flower of wonderful magnificence, and owes the diminution of regard to the facility of its propagation: the ſpecific characters are, heart-ſhaped leaves, marked with three principal nerves; peduncles thickening immediately under the calyx; and the flowers nodding. No flower is more proper than this, from its great ſize, to give you an idea of a compound flower, and its component floſcules, or florets and ſemiflorets; only you will remember not to expect ſeeds from thoſe of the ray, that being the character of the

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(*y*) Helianthus annuus *Lin.*

Order. This plant had its name from the form of the flower, not from any power it poſſeſſes of turning towards the ſun: there is uſually but one flower on a ſtalk, but I have had four in my garden on a ſingle ſtem, looking to the four cardinal points. *Perennial Sunflower* (z) is yet more common than the laſt, becauſe it ſpreads much at the root, and requires no care in the cultivation: the inferior leaves of this are heart-ſhaped and three-nerved, but the upper ones ovate. The flowers, though much ſmaller than thoſe of the laſt, are yet the largeſt and moſt ſightly of the perennial ſorts, and the ſame plant produces abundance of them. You will be on your guard againſt double flowers. The perennial ſpecies ſeldom produce ſeeds in our climate; whereas the annual, which can be propagated no otherwiſe, has them in plenty. *Jeruſalem Artichoke* (a) is alſo a ſpecies of *Helianthus*; the leaves are *ovato-cordate*, or egg-ſhaped, only hollowed at the baſe; they are alſo marked with three principal nerves: this frequently does not even flower, but it is cultivated not for the ſake of theſe, but the tuberous or knobbed roots, reſembling in form the potatoe, but in taſte an artichoke bottom. There is a ſpecies, which has the common or trivial name of *giganteus* or *giant: Jeruſalem Artichoke* juſtly merits the ſame title, for I have meaſured ſtems of it twelve feet high.

(z) Helianthus multiflorus *Lin.*

(a) Helianthus tuberoſus *Lin.*

Centaurea is a moſt numerous genus of the ſame third Order, containing no leſs than ſixty-ſix ſpecies. The corols of the ray are funnel-form, or tubular, longer than thoſe of the diſk and irregular; the down is ſimple; and the receptacle has briſtles between the florets. This otherwiſe unwieldy genus is commodiouſly ſubdivided into ſix ſections, by the variations of the calyx, which you obſerve makes no part of the generic character. I. Plants commonly called *Jaceas*, with ſmooth, unarmed calyxes. II. *Cyanuſes*, with the ſcales of the calyx ſawed and ciliated. III. *Rhaponticums*, with dry, ſcarioſe ſcales, like chaff, or as if parched. IV. *Stoebes*, with the ſpines of the calyx palmated. V. *Calcitrapas*, with the ſpines of the calyx compound or ſubdivided. VI. With the ſpines ſimple or wholly undivided. To the firſt ſection belongs the *Sweet Sultan* (*b*), which has a roundiſh calyx with ovate ſcales; and lyrate leaves, indented about the edge. It is an annual plant, with purple flowers, of a ſweetneſs ſo powerful as to be offenſive to many perſons; they come out ſingly on long naked peduncles, and frequently vary to fleſh colour and white.

(*b*) Centaurea moſchata *Lin.*

There is a yellow Sweet Sultan, which differs not only in the colour of the flowers, and in having a milder odour, but alſo in having the edges of the leaves ſerrate: it is doubtful however whether it be a diſtinct ſpecies from the former. The *Great* or *Officinal Centaury* (*c*) is alſo of this ſection: the ſcales of the calyx are ovate; the leaves are pinnate, and the lobes or diviſions ſerrate and decurrent. The plant is large and tall, and the flowers are purple.

Of the ſecond ſubdiviſion we have three plants commonly wild, and one little leſs common in gardens. *Common* or *Black Knapweed* (*d*), perhaps more properly *Knob-weed*, which the country people in ſome places call *Hard-heads*, is found in almoſt all paſtures, and is one inſtance, among many others, of the vile weeds which are ſuffered to occupy graſs fields with impunity: the ſcales are ovate, with erect, capillary *ciliæ* or fringes: the leaves are lyrate and angulate; and the flowers are floſculous. *Great Knapweed* (*e*) has pinnatifid leaves, with the lobes lanceolate. This grows in corn fields and on balks. The flowers of both are red; but thoſe of the latter are much the largeſt and moſt ſpecious. *Blue-bottle* (*f*), the third

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(*c*) Centaurea Centaureum *Lin.*

(*d*) Centaurea nigra *Lin.*

(*e*) Centaurea Scabioſa *Lin.*

(*f*) Centaurea Cyanus *Lin.*

third wild plant of this ſection, which every body knows for an univerſal weed among corn, and whoſe beautiful blue colour would have attracted regard, had it been rare; has linear leaves, which on the ſtem are quite entire; towards the ground they are broader, indented about the edges, and ſometimes pinnate. *Mountain Blue-bottle* (g), which has migrated from the Swiſs mountains into our gardens, is very nearly allied to this, but its flowers are much larger: the leaves alſo are lance-ſhaped and decurrent, and the ſtem is quite ſimple, whereas the wild ſort is branched. *Carduus Benedictus* or *Bleſſed Thiſtle* (*h*) is an inſtance of the fourth ſection: it has doubly ſpined, woolly calyxes, furniſhed with an *involucrum*; the leaves are ſemi-decurrent, indented and prickly: this is a ſmall annual plant with yellow flowers. We have a wild ſpecies of this ſection—the *Star-thiſtle* (*i*), growing by road ſides, and in dry paſtures, but not every where: it has ſeſſile flowers, with the calyxes rather doubly ſpined; the leaves pinnatifid, linear and toothed; the ſtem hairy and much branched: the ſpines of the calyx are white, and the flowers red. Of the other ſections none are likely to meet your eye; indeed the roughneſs

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(*g*) Centaurea montana *Lin.*
(*h*) Centaurea benedicta *Lin.*
(*i*) Centaurea Calcitrapa *Lin.*

and vulgarity of their habit, in which they much reſemble Thiſtles, have occaſioned the numerous ſpecies to be little cultivated.

The *Marigold* of the kitchen garden will furniſh a familiar inſtance of the fourth Order—*Polygamia Neceſſaria.* The genus is known by a calyx of many equal leaves; by the ſeeds having no down, and thoſe of the diſk being membranous: and by the receptacle being naked. The *common* or *officinal* (*k*) ſpecies is diſtinguiſhed in having all the ſeeds boat-ſhaped, bent inwards and muricate.

In the *Segregate* Order, beſides the calyx or perianth common to the whole flower, there is a ſecondary one, including ſeveral floſcules, or ſometimes one only; this forms one character of the genera. *Echinops* has only one flower to each partial calyx: beſides this, the floſcules are tubular, and complete; the ſeeds have an obſcure down; and the receptacle is briſtly. *Common Globe-thiſtle* (*l*) is ſo called from the flowers growing in globular heads; the leaves are ſinuous and pubeſcent, the jags ending in ſpines; the flowers are blue, and ſometimes white.

We have now done with the Natural Tribe of Compound Flowers, but there remains

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(*k*) Calendula officinalis *Lin.*

(*l*) Echinops ſphærocephalus *Lin.*

mains yet one Order of the Claſs *Syngeneſia*, in which the flowers are totally different, except in the common character of the union of the five anthers; they are ſimple, like the flowers of other claſſes, or have only one corol incloſed within the calyx without any common perianth. The *Violet* will furniſh you with a number of notorious examples of this Order. All the ſpecies, which are twenty-nine, agree in a five-leaved calyx; a five-petalled, irregular corol, produced into a horn or ſpur behind; and in a three-valved, one-celled capſule, above the receptacle, or incloſed within the calyx. The *Sweet Violet* (*m*), that ſcents the banks, hedges and borders of woods, in the ſpring, with its fragrant purple flowers, is one of thoſe which have no ſtalks, except the ſcape which ſupports the flower, and the runners by which they are propagated; the leaves are heart-ſhaped. The corols are ſometimes white, and the gardens boaſt a large double variety. This is one of the few wild plants, whoſe allowed merit has ſecured it a place in every cultivated ſpot. The later ſpecies without ſcent, commonly called *Dog Violet* (*u*), is one of the cauleſcent or ſtalky kind, the more adult ſtems aſcending; the leaves are heart-ſhaped, but

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(*m*) Viola odorata *Lin.*
(*u*) Viola canina *Lin.*

drawn to a point at the end: the corol is paler than that of the Sweet Violet, and having leaves proceeding from a ſtalk, cannot be miſtaken for that, in which they grow immediately from the root, even if the odour were not attended to. *Heart's-eaſe* or *Panſies* (*v*), the univerſal favourite of the more ſimple, unrefined ages, is one of thoſe which have pinnatifid ſtipules, and an urceolate or pitcher-ſhaped ſtigma; it has alſo a three-cornered, diffuſe ſtem; and oblong, gaſhed leaves. Such are the characters of a plant, which every child becomes acquainted with, as ſoon as he can walk into a garden; but it is not therefore wholly uſeleſs to mention it, becauſe it may at leaſt ſerve to explain ſeveral terms to you, and to aſſiſt you in the examination of plants with which you are not ſo well acquainted.

When we compare the diminutive and almoſt colourleſs Panſy, which we find wild among the corn, with the ample rich-coloured corol, that boaſts the tiſſue of velvet, ſuch as we ſee in ſome curious gardens; we cannot but allow that human art has

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(*v*) Viola tricolor *Lin.* This has numberleſs provincial names, bearing ſome alluſion to love.

" Yet markt I where the bolt of Cupid fell,
" It fell upon a little weſtern flower,
" Before milk white, now purple with Love's wound,
" And maidens call it *Love in Idleneſs.*

Midſ. Night's Dream, II. 2.

made a conſiderable improvement: and we ſurvey it with the more pleaſure becauſe it is not at the expence of the natural characters of the flower: and you may enjoy it both as a botaniſt and a floriſt.

That beautiful flower called *Balſam*, is of this Order. Linnæus names the genus *Impatiens*, becauſe the capſule when ripe, is impatient of the touch, eaſily burſting, and thus throwing out its ſeeds. It has an irregular corol of five petals like the violet, when it has not been improved into beautiful duplicity by culture; but the calyx is two-leaved; the nectary or horn is cucullate or cowl-ſhaped; and the capſule is five-valved. *True Balſam*, or more properly *Balſamine* (*w*), has the leaves lance-ſhaped, thoſe on the upper part of the plant alternate; the flowers come out three or four together, from the joints of the ſtalk, only one on each ſlender peduncle; and the nectary is ſhorter than the flower: the varieties of colour—white, red, purple and variegated, are well known. That which comes from the Eaſt-Indies has larger, finer flowers than what comes from the Weſt, moſt beautifully variegated with ſcarlet and white, or purple and white. We have a wild ſpecies called *Yellow Balſam*, and alſo by the familiar names of *Quick in hand*, or

(*w*) Impatiens Balſamina *Lin.*

Touch me not (*x*) : one long ſlender peduncle comes out from the *alæ*, which ſubdivides into ſeveral others, each ſuſtaining a yellow flower ; the leaves are ovate ; and the ſtem ſwells at the knots. This is a local plant, being obſerved only or chiefly in Weſtmoreland and Yorkſhire, in moiſt ſhady places, or by the ſides of lakes and rivers.

You have now abundant amuſement for your autumnal walks ; and as the ſeaſon for examination will be over, before I ſhall have leiſure to prepare you freſh matter for future amuſement, I take leave of you 'till the enſuing ſpring ; when if health and leiſure permit, we will travel through the few remaining Claſſes.

(*x*) Impatiens noli tangere *Lin.*

LETTER XXVII.

May the 1ſt, 1777.

I RENEW our purſuit as early as poſſible, my dear Couſin, in order that I may be able to accompliſh my purpoſe of completing our original ſcheme, during the courſe of the preſent ſeaſon.

The twentieth Claſs, which falls now under our conſideration, is entitled *Gynandria*, from a circumſtance peculiar to it, which is that of having the ſtamens ſituated upon the ſtyle itſelf. You have remarked, that in every Claſs hitherto examined, theſe two parts are entirely independent, ſo that we can at any time remove the one from a flower, and leave the other; but in the Claſs *Gynandria* this is not permitted us; the ſtamens uſually growing out of the piſtil itſelf; but in ſome caſes upon a receptacle, produced or lengthened in form of a ſtyle, which bears both piſtil and ſtamens. This Claſs has nine Orders, founded on the number of ſtamens in the flowers of each; the genera are 33, and the ſpecies 275.

The firſt Order, called *Diandria*, from there being two ſtamens only to the flowers in it, is perfectly natural; that is, contains a tribe of plants agreed upon by all the world to be in ſtrict alliance; or ſuch, as when an eye properly informed has ſeen one of them, it immediately refers any of the others to the ſame tribe, clan or family, as ſoon as they occur. Indeed the alliance between the greater part of theſe plants is ſo ſtrict, that ſome Nomenclators have been induced to refer them to one genus, or one family properly ſo called; for the genera differ hardly in any thing elſe from each other but in the ſhape of the nectary. Some former Nomenclators had eſtabliſhed the genera upon the roots, which are certainly the part leaſt proper for this purpoſe, becauſe you cannot examine the character, without deſtroying the plant. But they were induced to it, from the ſingular form of the roots in this tribe: which in ſome ſpecies are a pair of ſolid bulbs; in others a ſet of oblong fleſhy bodies tapering to the extremities, and ſpreading out like the fingers, whence they have the name of *palmate* or *handed*.

Having ſaid ſo much of this tribe, it is almoſt time, you think, to be acquainted with the ſingular perſonages that compoſe it. The far greater number of them then have the common appellation of *Orchis*, a name I am perſuaded you are not wholly unacquainted with.

Take one of theſe flowers, of any ſort you can meet with; or if no ſpecies is yet in blow, you will not have long to wait for ſome of them. You will find an oblong, wreathed germ, below the flower, which has no proper calyx, but only ſpathes or ſheaths: the corol is made up of five petals, the two innermoſt of which uſually join, to form an arch or helmet over the top of the flower; the lower lip of the corol forms the nectary, taking the place of the piſtil and a ſixth petal: the ſtyle adheres to the inner edge of the nectary, ſo that together with its ſtigma it is ſcarcely diſtinguiſhable: the filaments are very ſhort, and each of them is terminated by an anther, that has no covering, but has the texture of the pulp of oranges or lemons; each is lodged in a cell opening downwards, and adhering to the inner margin of the nectary; ſo that without this information you might have been at a loſs where to find the ſtamens, unleſs they happened to have burſt from their cells: the germ in time becomes a capſule, of three valves, opening at the angles under the carinated ribs; within is only one cell, and a great number of ſmall, irregular ſeeds, ſhaped like ſawduſt, are affixed to a linear receptacle on each valve. I have been more particular on the character of this tribe, becauſe the flowers have rather a ſtrange and unuſual appearance, owing to the ſingular poſition of the parts of fructification. There is a connection between this and the Liliaceous tribe; both having but one lobe to the ſeed, ſucculent roots, entire leaves, and a naked corol: they differ however in the number of ſtamens, the form of the corol and nectary, the ſituation of the germ, the number of cells in the capſule, the ſhape and arrangement of the ſeeds: this tribe alſo bears its flowers on a ſpadix, and has bractes interpoſed between them.

The principal genera of this tribe are thus diſtinguiſhed:

Nectary horn-ſhaped. *Orchis.*
——— bag-ſhaped. *Satyrium.*
——— ſlightly keeled. *Ophrys.*
——— ovate, gibbous underneath. *Serapias.*
——— pedicelled. *Limodorum.*
——— inflated. *Cypripedium.*
——— turbinate or top-ſhaped. *Epidendrum.*
——— connate with the ringent corol. *Arethuſa.*

The *Orchis* is the largeſt genus, there being no leſs than 45 ſpecies, of which 11 are found wild in England. The greater number have double bulbs; in the reſt the roots are either palmate or faſciculate.

Of thoſe with double bulbs, woods and buſhy paſtures produce the *Butterfly Orchis* (*y*), which has the lip of the nectary lance-

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(*y*) Orchis bifolia *Lin.*

ſhaped (z), and quite entire; the horn very long; and the petals ſpreading out wide. The flowers of this ſmell ſweet, particularly in an evening, and very early in the morning. There are only two, or at moſt three large leaves: the ſtem is a foot, or eighteen inches high: the ſpike is long, but the flowers are thinly ſpread in it: the bractes are large, and of the length of the germ: the flowers are of a greeniſh white; the ſpur is twice as long as the germ, very ſlender, and tranſparent enough for you to diſcern the nectar through it. There is a ſmaller variety, but differing no otherwiſe than in ſize.

Pyramidal Orchis (*a*), found in paſtures where the ſoil is chalky, is another of thoſe which have double bulbs: the lip of the nectary is two-horned, trifid, the ſegments nearly equal, the middle one being rather the narroweſt; all of them are quite entire: the horn, or ſpur, is cylindric, ſlender, and longer than the germ; and the petals are nearly lance-ſhaped. This is an elegant ſpecies, having ſix or more radical leaves; the ſtem a foot, or eighteen inches high; the ſpike of flowers ſhort, of a broad conical form, and very thick ſet at firſt; the bractes at leaſt equal in length to the germs, lance-ſhaped, and ending in a point; the corol bright purple.

(z) Haller ſays linear.
(*a*) Orchis pyramidalis *Lin.*

Two of the moſt common ſorts with double bulbs, are fooliſhly called *Male* and *Female Orchis*, becauſe there is no diſtinction of ſexes; and therefore theſe names are only calculated to miſlead. The firſt (*b*) differs from the ſecond in having the outer petals more acute and longer; and the middle lobe of the lip bifid and longer than the ſide ones: it is alſo a much larger plant, with broader leaves, uſually ſpotted. The ſecond (*c*) has the lip of the nectary crenulate, or ſlightly notched on the ſides, trifid, with the middle lobe emarginate, and the petals obtuſe and linear. The height of this ſeldom exceeds ſeven or eight inches; the leaves are half an inch broad; the ſpike is cylindric, and has few flowers; the bractes are coloured, and a little longer than the germs; the petals forming the helmet converge, and are marked with green parallel lines; the middle of the lip is ſpotted, and the ſides are rolled back; the horn is equal to the germ, with the end emarginate; the moſt common colour of the corol is deep purple, but it varies to roſe-coloured, and even white. The firſt is a foot, and even eighteen inches high; the leaves an inch

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(*b*) Orchis maſcula *Lin.*

(*c*) Orchis morio *Lin.*

and half broad; the ſpike handſome, long, and thin ſet with flowers; the bractes about the ſame length with the germs, purple and lance-ſhaped; the petals that form the helmet looſe, not converging, they are purple, with lines of the ſame colour; the edges of the lip are bent downwards, the colour pale purple, with deeper ſpots at the chops; the ſpur is ſtraight, thick, as long as the germ, or longer, dilated and compreſſed at the end. The colour of the corol varies, even to white. This grows in meadows; and the roots make excellent *Salep.* The ſecond affects open dry paſtures. Thus you have abundant means of diſtinguiſhing theſe two ſpecies of Orchis from each other; and the roots are a ſufficient mark of diſtinction from two others, no leſs common, which we ſhall examine preſently. In the mean time, there is a ſmall but pretty ſpecies with double bulbs, that we muſt not paſs by. It grows chiefly on dry expoſed chalk hills, and is called *Dwarf Orchis* (*d*): the lip of the nectary is quadrifid, and white dotted with purple; the horn is obtuſe, and the petals are diſtinct. The height is from four to ſeven inches; there are ſeveral leaves next the ground, but few on the ſtem; the ſpike is ſhort and cloſe ſet; the bractes are ſhorter

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(*d*) Orchis uſtulata *Lin.*

than the germ; the helmet is pointed, and of a deep purple on the outſide; within the petals are marked with lines and dots of purple; the horn is a little bent, and not half the length of the germ.

Two very common ſpecies with palmate, or handed bulbs, are the *broad-leaved* (*e*) and *ſpotted Orchis* (*f*), generally found in moiſt meadows. The firſt has the roots rather palmate and ſtraight; the horn of the nectary conic, the lip three-lobed, and turning back on the ſides; the bractes large, and longer than the flowers, ſo as to give the ſpike a leafy appearance. The horn is ſhorter than the germ, bent and obtuſe. The colour of the corol is purple, varying to roſe and white. The ſecond has narrower leaves, and a ſolid ſtem, whereas that of the firſt is hollow; it is alſo higher, and flowers later; the leaves of both are ſpotted with black, but this more generally; the bractes are ſmaller and narrower; the corol of a paler purple; the lip of the nectary is deeper cut, the ſide-lobes are notched, the middle one very narrow, quite entire, and drawing more to a point.

I ſhall mention only one ſpecies more of *Orchis*, and that alſo has palmate roots: it is found in paſtures, but by no means ſo com-

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(*e*) Orchis latifolia *Lin.*

(*f*) Orchis maculata *Lin.*

mon as the two laſt: you may call it *long-ſpurred*, or *ſweet Orchis* (*g*), and you will know it by the great length and ſlimneſs of the ſpurs: the lip is trifid, equal, ſlightly notched, and obtuſe; and the ſide-petals ſpread out very wide. The ſtem is leafy, and grows to the height of eighteen inches; the bractes are ſharp pointed, and of the length of the germ; the corol is purple, and all of one uniform colour; the ſmell is ſtrong, but in ſome circumſtances ſweet.

The ſecond genus of this natural tribe is the *Satyrium*, which inſtead of the horn, or ſpur, has a ſhort bag-form, or double-inflated nectary, at the back of the flower. This is a much leſs numerous genus than the laſt, having only eight known ſpecies. Of theſe I ſhall ſelect two; *Lizard Satyrion* (*h*), and *Frog Satyrion*, commonly called *Frog Orchis* (*i*). The firſt is found in chalky paſtures, but rarely; and has been rendered more rare by the diligence with which it has been ſought after, to tranſplant it into gardens, where it ſeldom continues long, this tribe being generally abhorrent of culture. It has double undivided bulbs; lance-ſhaped leaves; the lip of the nectary trifid, the middle lobe linear, oblique, ex-

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(*g*) Orchis conopſea *Lin.*

(*h*) Satyrium hircinum *Lin.*

(*i*) Satyrium viride *Lin.*

tremely long, flaunting like a ribband, and ſeeming, as it were, bitten off at the end. It is a very large lofty plant, from eighteen inches to three feet in height; the leaves alſo are half a foot long and more, and three inches broad; the ſpike has many flowers, and, by age, grows very long and bent; the bractes are ſlender, acute, greeniſh, and twice as long as the germs; the colour of the corol is greeniſh without, and ruſty within, with purple lines and ſpots: the flower has a ſtrong goatiſh ſmell.

Frog Orchis is much more common in meadows. The bulbs of this are palmate; the leaves oblong and obtuſe; the lip of the nectary trifid, with the middle lobe obſolete, or ſo ſmall as to be obſcure. This is a much lower and ſmaller plant than the former, not being above ſeven or eight inches high: the radical leaves are broad and ovate; thoſe on the ſtem, which are few, lance-ſhaped: the ſpike is rather thin ſet with flowers; the bractes are lance-ſhaped, and longer than the germ: the helmet is almoſt cloſed, pale green, with a purple line dividing the petals; the lip is yellow, hangs down ſtraight, and grows broader towards the end; the whole corol becomes duſky red with age.

The third genus of the *Orchis* tribe is entitled *Ophrys:* it has no horn or bag at the back of the corol, but one petal longer

than

than the reſt, hanging down, and marked underneath with a longitudinal riſing, called the keel. This it is which in ſome ſpecies takes the form of an inſect ſo exactly, as to appear real at a certain diſtance.

One ſpecies, called *Common Twayblade* (*k*), or *Twyblade*, from its having always two leaves, and no more, is frequent in woods and buſhy paſtures. It has fibrous roots, two ovate leaves, and the lip of the nectary bifid. The ſtem is eighteen inches high, rather rough or hairy, and naked, except the two large leaves in the middle, between the root and the ſpike, which is ſometimes ſix inches long, and has forty flowers, thin ſet on ſhort peduncles; the bractes are very ſmall, broad, and ſharp-pointed; the germ is round, and thicker than in any other of the ſpecies; the corol is of a greeniſh yellow.

The latter end of ſummer, and beginning of autumn, flowers the *Spiral Ophrys*, commonly called *Triple Ladies Traces* (*l*); you will find it on heaths and dry paſtures. The root conſiſts of oblong aggregate bulbs; the ſtem is a little leafy, the flowers are ſpiral, and all on one ſide of the ſtem; and the lip of the nectary is undivided and ſlightly notched.

(*k*) Ophrys ovata *Lin.*
(*l*) Ophrys ſpiralis *Lin.*

notched. This is a ſmall plant, ſeldom above five or ſix inches high, though in a leſs dry ſoil it will riſe to a foot; it has four or five leaves next the ground; the ſpike is long and ſlender, having twenty flowers, white within and yellowiſh without; the bractes are not flat, but hollow, and longer than the germ; the three outer petals of the corol are glued together; the lip is roundiſh and ciliate. It has a pleaſant odour.

But the moſt intereſting and admired ſpecies of this genus, are the *Fly* and *Bee Orchiſes,* which agree in having two roundiſh bulbs, and a leafy ſcape or ſtem. Linnæus thinks the Fly and the two Bees (*m*) not to be ſpecifically different, but in this I cannot agree with him. *Fly Ophrys* or *Orchis* (*n*) has the lip of the nectary quadrifid; in the *common Bee Orchis* (*o*) it conſiſts of five lobes, which are deflexed or bent downwards; and in the *green-winged Bee Orchis*, now called *Spider Ophrys* (*p*), it is roundiſh, entire, emarginate, and convex. But beſides this character from the lip of the nectary, the *Fly* is a ſtiffer, ſtraighter plant than the *Bee,* not ſo leafy, and having the flowers thinner ſet:

(*m*) Ophrys inſectifera *Lin.*

(*n*) Orchis muſciflora *Halleri.* Ophrys inſectifera myodes *Lin.* Oph. muſcifera *Hudſ.*

(*o*) Orchis fuciflora *Hall.* Ophrys apifera *Hudſ.*

(*p*) Ophrys inſectifera arachnites *Lin.* Oph. aranifera *Hudſ.*

ſet: in other reſpects they are much alike, except in the corols, which are widely different: that of the Fly has the three outer petals ovate, entire, ſmooth, herbaceous, and ſpreading; the two inner linear and dark purple: the lip of the nectary oblong, dark purple above, and herbaceous underneath, with a blue ſpot or band below the upper lobes. *Bee Orchis* has the three outer petals ſpreading, oblong, and purple, marked with three green nerves; the two inner lateral ones linear, villous, and green; the lip of the nectary large, roundiſh, purple, and like velvet, the lobes deflexed, with a double variegated-yellow, ſmooth, ſhining ſpot at the baſe. *Spider Orchis* is a lower plant, the lip of the nectary is of a leſs chearful colour, without any of the yellow that decorates the *Bee*, and both helmet and wings are green: the three outer petals are oblong and ſpreading, the inner linear and ſhorter; the lip of the nectary is large, roundiſh, entire, emarginate, convex, and appearing like velvet, duſky purple above, with a green edge, and a double ſpot at the baſe; beneath, it is herbaceous. Theſe three beautiful plants are found among graſs in a chalky ſoil, and form a ſucceſſion from April to Auguſt: the *Spider* comes firſt in April and May, the *Fly* next in June, and laſt of all the *Bee* in July and Auguſt.

I have been the more particular on this ſingular tribe of plants, becauſe ſpurning culture they are not liable to eſſential changes, or indeed to any that I know of, except in colour: you muſt alſo ſearch for them abroad, and conſequently unite exerciſe with ſtudy, which is one of the principal advantages of botany; for I cannot allow you to gather plants by proxy, ſince you would thus loſe half the pleaſure of the purſuit, as well as the benefit: and why ſhould you not have as much enjoyment in ſearching for a beautiful plant, or finding an elegant flower, as the men have in looking for a hare, or ſhooting a partridge. I will only add, that ſhould you be ſo happy as to meet with the *Lady's Slipper* (*q*), you would be highly delighted with its ſingular, large, hollow, inflated nectary, the form of which has given occaſion to the name. Haller however obſerves, that it has more reſemblance to a wooden ſhoe in form, and therefore is unworthy the title of *Venus's Slipper*, which Linnæus has beſtowed upon it. Without entering into this important diſpute, I will obſerve to you, that the root is fibrous; the ſtem about a foot high, and leafy; the two firſt leaves ſmall, and keeping almoſt cloſe to the ſtalk; the reſt, (from four to ſeven) ovato-lanced; one, or at moſt two flowers

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(*q*) Cypripedium Calceolus *Lin.*

come out on the ſame ſtem, of which there are ſometimes ſeveral from the ſame root: the bracte is very large, as is alſo the germ: there are but four petals to the flower, ſpreading out almoſt at right angles to each other, and often convolute; their colour is purple; of the two outer petals, one ſtands up above the nectary, the other hangs down behind it; the two inner petals ſtand out ſideways, and are narrower: the ſlipper or lip of the nectary is yellow, ſpotted within, and marked longitudinally with ridges and furrows.

In the Order *Pentandria*, you will find the numerous and beautiful genus of *Paſſion-flower*. The flowers have three piſtils, a five-leaved calyx, five petals to the corol, a radiate crown for a nectary; and the fruit is a berry on a pedicle. None of the ſpecies are European, but moſtly natives either of New Spain, the Braſils, or the Weſt-Indian Iſles; ſo that they require the protection of the conſervatory at leaſt, if not of the ſtove, except one or two, which will ſtand abroad in a ſheltered ſituation, with a little attention in ſevere weather. I ſhall ſelect the ſpecies which you are moſt likely to meet with, rather than the rareſt. *Blue Paſſion-flower* (*r*), though a native of the Braſils, is ſeldom injured with us, except in very

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(*r*) Paſſiflora cærulea *Lin.*

ſevere winters. Againſt a houſe it may be trained up to the height of forty feet, and throws out annually ſlender ſhoots, fifteen or ſixteen feet long: the leaves are palmate or handed, compoſed of five ſmooth, entire, obtuſe lobes, the middle one longeſt, the outer ſhorteſt and often divided; they are petiolate, the petioles have two glands, and at their baſe is a ſtipule in form of a creſcent, and a long claſper, by which the ſlender ſhoots ſupport themſelves: the flower comes out at the ſame joint with the leaf, on a peduncle near three inches long; round the centre of it are two radiating crowns, the inner inclining towards the central column, the outer, which is longer, ſpreading flat upon the petals, and compoſed of innumerable threads, purple at bottom, but blue on the outſide. On the top of the central column ſits an oval germ, from whoſe baſe five awl-ſhaped ſtamens ſpread out horizontally, and theſe are terminated by oblong, broad, pendent anthers, which are eaſily moveable; from the ſide of the germ ariſe three ſlender, purpliſh ſtyles, diverging, and ending in obtuſe ſtigmas: the flower continues but one day, but there is a conſtant ſucceſſion from July 'till autumnal froſts ſtop them. The germ ſwells to a large, oval fruit, of the ſize, ſhape and colour of the Mogul Plum, incloſing a ſweetiſh, but diſagreeable pulp, in which the oblong ſeeds are lodged.

Incarnate or *trilobate Paſſion-flower* (*s*) is a native of North America, and though the firſt ſpecies known among us, is not ſo common as the *Blue*. It differs from the former in having only three lobes to the leaves, which are ſerrate or toothed like a ſaw; the ſide lobes are ſometimes divided into two narrow ſegments: the petals of the corol are white, with a double, purple fringe, ſtar or glory: the fruit is as large as a middling apple, and when ripe is of a pale orange colour.

There is a ſort, called *Granadilla* (*t*) in the Weſt-Indies, where the fruit is eaten. It has undivided, oblong leaves, hollowed next the petiole, which has two glands; the involucres are quite entire, as are alſo the leaves about the edge. The corol is large, with white petals, and a blue glory. The fruit is roundiſh, the ſize of a large apple, and yellow when ripe.

Another ſort, called *Water Lemon* (*u*) in the Weſt-Indies, has an agreeable acid flavour in the pulp of the fruit, which quenches thirſt, and is given there in fevers. It has undivided ovate leaves, quite entire about the edge; two-glanded petioles; and toothed involucres: the corol is white

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(*s*) Paſſiflora incarnata *Lin.*

(*t*) Paſſiflora maliformis *Lin.*

(*u*) Paſſiflora laurifolia *Lin.*

with browniſh red ſpots, and the glory or crown is violet: the fruit is of the ſize and ſhape of a pullet's egg, and when ripe is yellow. But ſince theſe, and much leſs the remaining ſpecies, may not readily fall under your cognizance, I reſtrain my deſire of enlarging on ſo remarkable and beautiful a genus; and paſs on to a vulgar plant, which you will find in the laſt Order, *Polyandria*, and with that I will cloſe our examination of this Claſs, and my prate for the preſent.

This is the common *Arum, Wake-Robin* or *Cuckow-pint* (*v*), called alſo vulgarly *Lords and Ladies*. Early in the ſpring it puſhes up a one-leafed cowl-ſhaped ſpathe, under hedges and among buſhes; if you open this ſpathe, you diſcover a ſpadix, naked on the upper part, covered with germs at the bottom, and with anthers in the middle. This is diſtinguiſhed from the other ſpecies, which are many, by having no ſtem but that which bears the fructification, haſtate leaves that are quite entire, and the ſpadix club-ſhaped. Though it has the trivial name from the black ſpots upon the leaves, yet that is not a conſtant character, for oftentimes they are quite plain. As the plant advances the ſpathe opens, and diſcovers the club, varying from yellowiſh green to fine

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(*v*) Arum maculatum *Lin.*

purple or red, theſe gradually decay, and leave a head of round red berries, which, as well as the reſt of the plant, are very hot and biting. To this, with ſome others nearly allied to it, you would perhaps find it difficult to aſſign the proper Claſs, unleſs from the ſtrange and unuſual appearance of the fructification, you were led to ſearch for it in that now under conſideration. Theſe have not properly the ſtamens growing upon the ſtyle, but both are born upon a receptacle lengthened out in manner of a ſtyle, and performing the ſame office as the piſtil in the other genera. Linnæus obſerves that he might, and perhaps ought to have ranged ſuch plants under other Claſſes; but he was deterred by the difficulty of aſſigning the number of ſtamens to each piſtil. If he found any difficulty in removing them, you and I, dear Couſin, will leave them quietly in the place which he has aſſigned them.

LETTER XXVIII.

May the 15th, 1777.

WE have hitherto, dear Couſin, been converſant with ſuch plants, as bear perfect or complete flowers only, except in the Claſs *Syngeneſia,* wherein we found imperfect, and even neuter floſcules among the perfect ones. But in the twenty-firſt and twenty-ſecond Claſſes, which we are now to examine, you will never find any complete or perfect flowers; on the contrary, if they have ſtamens, there are no piſtils, and if they have piſtils, they are deficient in ſtamens. This is the common character of theſe two Claſſes, and the only difference between them is, that in the Claſs *Monoecia,* the ſtaminiferous and piſtilliferous flowers are found on the ſame individual plant; whereas in the Claſs *Dioecia* they are always on diſtinct plants of the ſame ſpecies. It is ſcarcely neceſſary to add, that in both, the flowers which produce ſtamens, fall off without being followed by fruit or ſeed; and that the others, which have the germ, are fruitful.

The Claſs *Monoecia,* which is the twenty-firſt in the Syſtem, has eleven Orders, taking their titles and characters from the foregoing Claſſes; eighty genera, and three hundred and ſeventy ſpecies.

The third Order, *Triandria*, contains ſeveral genera nearly allied to the Graſſes in habit, leaves, and placentation, or having only a ſingle lobe to the ſeed: they differ however in the culm or ſtraw not being hollow, but filled with a ſpungy ſubſtance; and in having no corol.

Since Haller thinks there is a natural connection between the *Arum*, with which I finiſhed my laſt letter, and the *Typha* or *Cat's-tail*, let us begin our examination with this. Having three ſtamens, it belongs of courſe to the Order *Triandria*, and having the air of the Graſſes, it ranges in the natural tribe of the *Calamariæ*, juſt mentioned. The flowers of both ſorts are born on a cylindric *Ament*; the ſtamineous flowers ſurrounding the end of the ſtem; and thoſe which have the piſtils growing in the ſame manner below them, and very cloſe ſet: there is no corol to either: the firſt have an obſcure, three-leaved calyx; in the ſecond it conſiſts of pappous or villous hairs, and theſe have one ſeed, ſitting on a capillary down or briſtle: ſuch are the generic characters. The *greater*, or *broad-leaved Cat's-tail*, otherwiſe called *Reed-mace* (*w*), is known by its ſword-ſhaped leaves, and by having the two aments approximating. It is a large plant, being about ſix feet in

(*w*) Typha latifolia *Lin.*

height, with leaves three feet long and more, but not an inch wide; it is common in the water, on the banks of rivers, but eſpecially in moats, ponds and marſhes. There is a ſmaller ſpecies (*x*), not ſo common, which has ſemicylindric leaves, and the two aments remote from each other; the ſtem of this is not above three feet high, and the leaves are much narrower, ſtiffer, and embrace the ſtem more.

Sparganium or *Bur-reed* approaches very near to *Typha*: but the flowers of each ſort are collected into a head, or roundiſh ament, thoſe which have ſtamens above, and thoſe which have piſtils below, on the ſame ſtem: neither have any corol; both have a three-leaved calyx; the piſtilliferous flowers have a bifid ſtigma, and are followed by a ſingle juiceleſs drupe, containing one ſeed. *Erect* or *greater Bur-reed* (*y*) is common in the ſame ſituations with *Typha*, and few plants exhibit more plainly the character of the Claſs *Monoecia*. The ſtem is erect, and about three feet high; the leaves are erect and three-ſided, but the upper ones flat: the ſtalk is generally branching.

Mays, otherwiſe called *Indian* or *Turkey Corn* (*z*), is of the ſame tribe. The ſtamin-

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(*x*) Typha anguſtifolia *Lin.*

(*y*) Sparganium erectum *Lin.*—ramoſum *Hudſ.*

(*z*) Zea Mays *Lin.*

cous flowers are born in looſe ſpikes: their calyx is a two-flowered awnleſs glume; neither has the corol any awn. The other flowers, which have one piſtil only, are in very cloſe ſpikes, below the former, and are incloſed with leaves. The glume both of calyx and corol is bivalved: the ſtyle is filiform, very long and pendulous: one ſeed follows each flower: the receptacle is oblong and hollowed, ſo that the ſeeds are immerſed half way into it, forming a very denſe ſpike. The Weſt Indian Mays has a ſtalk ten or twelve feet high; long, broad leaves; and ſpikes from nine inches to a foot in length, formed of golden grains. That which is cultivated in Italy, Spain and Portugal, has more ſlender ſtalks, not more than ſix or ſeven feet high; the leaves narrower; the ſpikes ſhorter and more ſlender, with white grains. The North American Mays, which is the ſame with what is cultivated in Germany, does not riſe more than four feet in height; the leaves are ſtill ſhorter and narrower; the ſpikes not more than four or five inches long, with yellow and white grains mixed: the colour of theſe however varies; and indeed the three diſtinctions are but varieties ariſing from ſoil and climate.

Carex or *Sedge* is a moſt numerous genus of the ſame Order, and the ſame natural tribe. The flowers of both ſorts are born on an ament or catkin, and each flower has a one-leafed calyx, and no corol: the piſtilliferous flowers, which are generally in diſtinct aments below the others, have an inflated, three-toothed nectary, three ſtigmas, and a three-ſided ſeed incloſed within the nectary. Some few ſpecies have only one ſpike; many have ſeveral ſpikes, with both ſorts of flowers in each; but more have the ſtaminiferous and piſtilliferous flowers in diſtinct ſpikes. Theſe plants grow chiefly in marſhes, bogs, ditches, wet woods and the banks of brooks and rivers; they are the graſs and fodder of fenny countries, and low, ſwampy grounds.

In this Claſs, *Monoecia*, as well as in the next, you will find many trees. In the Order *Tetrandria* — Birch, Alder, Box, Mulberry; in that of *Polyandria*—Oak, Cork, Evergreen Oak, Walnut, Hickery, Cheſnut, Beech, Hornbeam, Hazel, Plane;—and laſtly in that of *Monadelphia*—all the ſpecies of Fir and Pine, Cedar, Larch, Arbor Vitæ, Cypreſs.

Alder is of the ſame genus with *Birch*: their common character is, that the flowers of both ſorts grow in aments or catkins, each ſeparate from the other; that the calyx is one-leafed and trifid; that each calyx in the ſtaminiferous ament includes three flowers, that have four-parted corols: in the piſtilliferous aments there are only two flowers in each calyx, without any corol; but theſe are followed by ſeeds winged with a membrane on both ſides, whereas the others drop from the tree, without leaving any mark behind them. In examining theſe, and the flowers in general of this and the following Claſs, I muſt once for all inform you, that ſince many of them are cloſe ſet together in the ſame ament, you muſt carefully ſeparate one flower from the reſt, to avoid confuſion. You muſt alſo look for them very early in the ſpring, ſince moſt of the foreſt and timber trees flower before the leaf-buds expand.

Common Birch (*a*) has ovate leaves, drawn to a very narrow point at the end, and ſerrated, or ſharply toothed round the edge. Linnæus diſtinguiſhes the *Alder* (*b*) by its branching peduncles: the ſeeds alſo are born on a roundiſh *ſtrobilus*, rather than an ament; and the leaves are roundiſh, crenated or obtuſely notched round the edge; they are of a dark green, with very prominent nerves underneath, and little ſpungy ſubſtances where they divide: the bark of the Alder is black, whereas that of Birch is white.

In *Box* both ſorts of flowers come forth together in bunches, from the *alæ* of the leaves or branches, and ſit cloſe to the ſtem: the ſtaminiferous flowers have a

(*a*) Betula alba *Lin.*
(*b*) Betula Alnus *Lin.*

three-leaved calyx, with two petals to the corol, and the rudiment of a germ; the piſtilliferous flowers have a four-leaved calyx, three petals to the corol, three ſtyles, and a three-celled capſule, terminated by three beaks, and having two ſeeds in each cell. Properly ſpeaking, there is only one ſpecies of Box (*c*), varying a little in the ſhape of the leaves, and much in the ſize.

Mulberry bears the ſtaminiferous flowers in an ament; the others in a ſeparate roundiſh head, which afterwards becomes a compound berry, with one ſeed in each protuberance: the firſt have a four-parted calyx; in the piſtilliferous ones it is four-leaved, and theſe have two ſtyles; neither have any corol. *White Mulberry* (*d*), which is the ſort commonly cultivated in France and Italy for feeding ſilkworms, has ſmooth leaves, obliquely heart-ſhaped, and white fruit. *Black Mulberry* (*e*) has rugged, heart-ſhaped leaves: though cultivated for the fruit, yet the leaves are preferred to thoſe of the other for feeding ſilkworms, and are uſed for that purpoſe in Perſia, from whence this tree originally came into the ſouth of Europe. White Mulberry is a native of China. Of another ſpecies (*f*), Paper is made

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(*c*) Buxus ſempervirens *Lin.*

(*d*) Morus alba *Lin.*

(*e*) Morus nigra *Lin.*

(*f*) Morus papyrifera *Lin.*

made in Japan, from the bark; this has palmate leaves, and hiſpid fruit. *Fuſtick wood (g)* is alſo from a ſpecies of Mulberry; this has axillary thorns, and the leaves are oblong and more extended on one ſide than the other. This grows in the iſlands of the Weſt Indies, but in greateſt plenty at Campeachy: the wood is imported into Europe from both places for the uſe of the dyers, but the tree is too tender to ſupport our climate.

In the Order *Polyandria* the *Oak* leads the way. The ſtaminiferous flowers hang on a looſe ament or catkin, whilſt the piſtilliferous ones are ſeſſile in a bud: the calyx of the former is moſtly quinquefid, and the ſtamens are from 5 to 10 in number: in the latter the calyx is one-leafed and quite entire, and there is one ſtyle, ſplit into five parts; but ſometimes only into two, three or four. The fruit, or acorn, is well known: it is an oval nut, covered with a tough ſhell, and immerſed at bottom into the calyx or cup.

We have two principal ſorts, or perhaps rather varieties (*h*) in England: one with the leaves on longer petioles, and the acorns

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(*g*) Morus tinctoria *Lin.*

(*h*) Linnæus makes them one, under the title of *Quercus Robur*, and deſcribes the ſpecies as having deciduous leaves, of an oblong form but broader towards the upper part; the ſinuſes acute, and the angles obtuſe.

ſeſſile, or on very ſhort peduncles; the other, having the leaves not ſo deeply, but more regularly ſinuate, the ſinuſes being oppoſite; they have ſcarcely any petioles: on the contrary the acorns grow on very long peduncles, are larger, and come out fewer together. There are ſome other variations in this noble tree, which being leſs conſiderable, do not attract our notice as Botaniſts. Several ſpecies different from ours are found in North America; and ſome in the ſouthern countries of Europe.

Ilex or *Evergreen Oak* (*i*) has oblong-ovate leaves, of a lucid green above, but hoary underneath, ſtanding on long petioles, and continuing all the year; they vary much, ſome being quite entire, long and narrow; others broad, with the edges toothed and ſet with prickles, almoſt like thoſe of the Holly; the acorns are of the ſame ſhape with thoſe of the Oak, but ſmaller. The *grain-bearing Ilex* (*k*), which yields the *kermes* or ſcarlet grain, has ovate leaves toothed on the edge, and the indentures armed with prickles as in the Holly; they are ſmooth on both ſides: this is of ſo ſmall a growth, that it may be looked upon rather as a ſhrub than a tree. The *Cork-tree* (*l*)

(*i*) Quercus Ilex *Lin.*

(*k*) Quercus coccifera *Lin.*

(*l*) Quercus Suber *Lin.*

is a ſort of Ilex, with a chinky fungous bark, which is the principal as well as moſt obvious difference: in the air, and form of the leaves, it much reſembles the Evergreen Oak: the leaves however fall off in May, before the young ones come out, ſo that the Cork trees are bare for a ſhort time; which is not the caſe with the common Ilex. Moſt of the trees in this genus are much reſorted to by inſects, many of which form different ſorts of galls: but here we are ſtepping out of our province, and will return to it again, by taking the *Walnut* under conſideration.

This genus has the ſtaminiferous flowers thick ſet in oblong, cylindric catkins, under the lower leaves of the branches; they conſiſt of ſcales with one flower to each; the corol is ſix-parted; and the ſtamens are uſually eighteen, but vary in number from 12 to 24. The piſtilliferous flowers come out cloſe to the branches, above the others, at the baſe of a petiole, generally in pairs: theſe have a quadrifid calyx, crowning the germ; a four-parted corol; and two ſtyles: the fruit is a *drupe* containing a nut, with a furrowed ſhell, within which is a four-lobed, irregularly furrowed nucleus. *Common Walnut* (*m*) is diſtinguiſhed by having the component leaves oval, ſmooth, ſometimes a little toothed, and almoſt equal: there are

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(*m*) Juglans regia *Lin.*

many varieties in the fruit, and ſeveral diſtinct ſpecies in North America, one of which is the *Hickery* (*n*). All the ſpecies have pinnate leaves, with a different number of lobes; ours has from five to nine, and the odd lobe is rather the largeſt. *Hickery* has ſeven lance-ſhaped lobes, toothed on the edge, and the odd one ſeſſile.

Linnæus joins the *Cheſnut* and *Beech* in one genus, with this character: that the ſtaminiferous flowers, which are in catkins, have a quinquefid, bell-ſhaped calyx, and about twelve ſtamens: that the piſtilliferous flowers, which are produced from buds on the ſame tree, have a four-toothed calyx, three ſtyles, and a muricate, four-valved capſule, which before was the calyx, and contains two nuts. He obſerves that the ſtaminiferous flowers in the Cheſnut are diſpoſed on a cylindric ament, whereas thoſe of the Beech are in a ball. The catkins indeed of the former are very long, and the knots of flowers have near ten in each, and are diſtant from each other: the ſtamens are from 5 to 18, and have ſhort filaments: the piſtilliferous flowers are at the baſe of theſe, and are ſucceeded by two or three fruits cloſe together; their calyx has more frequently ſix ſegments than four; the fruit varies in the number of kernels and piſtils,

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(*n*) Juglans alba *Lin.*

but the moſt common number is ſix; and the kernels are convex on one ſide and flat on the other. The catkins of the Beech are roundiſh and looſe, with few flowers; the ſtamens are eight in number, on long filaments: there are only two piſtilliferous flowers together, and each of theſe is ſucceeded by a roundiſh nut, containing three or four hard three-ſided nuclei or kernels, which are commonly called *Beech maſt.* The ſpecific difference which Linnæus aſſigns to the *Cheſnut* (*o*) and the *Beech (p)*, is taken from the leaves; which in the firſt are lance-ſhaped, ſawed with the teeth ending in points, and naked or ſmooth on the under ſurface; in the ſecond, ovate and obſcurely toothed, or rather waving on the edge.

In the *Hornbeam* both ſorts of flowers are diſpoſed in catkins: both have a calyx conſiſting of one ciliate or fringed ſcale, and no corol: the one has from 8 to 14 or 16 ſtamens; the other has two germs, with two ſtyles to each, and at the baſe of each ſcale of the ament or *ſtrobilus* lies a ſeed, which is an ovate nut. In the *common Hornbeam* (*q*) the ſcales of the *ſtrobiles* are flat; and in the *Hop-Hornbeam* (*r*) they are inflated; ſuch

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(*o*) Fagus Caſtanea *Lin.*
(*p*) Fagus ſylvatica *Lin.*
(*q*) Carpinus Betulus *Lin.*
(*r*) Carpinus Oſtrya *Lin.*

is the ſpecific difference of theſe, which are the only known ſpecies. The leaves are wrinkled, marked with ſtrong nerves, of an ovate form, and ſharply toothed about the edge.

Hazel has the ſtaminiferous flowers on a long cylindric catkin, with one flower to each ſcale, which is trifid; it has from 6 to 10 ſtamens; generally eight: the piſtilliferous flowers are remote from the others, ſeſſile and incloſed in a bud; the calyx is two-leaved and torn: each flower has two very long, red ſtyles; but you muſt obſerve that there are ſeveral flowers in the ſame bud, which you muſt therefore ſeparate for examination: the fruit, as you know, is an ovate nut. As uſual, neither of the flowers have any corol. The *common Hazel nut*, and *Filbert* (*s*) are ſuppoſed not to be ſpecifically different, and the ſpecies is characterized by the ſtipules, which are ovate and end obtuſely; whereas thoſe of the *Byzantine* or *Spaniſh nut* (*t*), which Linnæus gives as a diſtinct ſpecies, are linear and end acutely. Theſe do not arrive at the dignity of trees, but are only ſhrubs.

The laſt tree I ſhall point out to you of this Order is the *Plane*; which has the flowers of both ſorts in globular aments: the

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(*s*) Corylus Avellana *Lin.*

(*t*) Corylus Colurna *Lin.*

ſtaminiferous flowers have a few very ſmall ſcales for the calyxes, a corol ſcarcely apparent, and anthers ſurrounding their filament: the piſtilliferous flowers have many very ſmall ſcales to the calyx; many petals to the corol; ſubulate ſtyles with recurved ſtigmas; and roundiſh ſeeds, terminated by a pointed ſtyle, and having a ſimple down adhering to their baſe. The two ſpecies of this tree, for there are no more, are well diſtinguiſhed by their leaves, which in the *Eaſtern* or *Aſiatic Plane* (*u*) are palmate; and in the *Occidental* or *Virginian* (*v*), lobate. The firſt was introduced early to Rome, and was the favourite tree of the Romans at their villas. All theſe trees are included in a natural tribe, called *Amentaceæ* by Linnæus, and *Juliferæ* by Haller and others: their character is ſufficiently obvious from their name, and what has been already ſaid in delivering the characters of the genera.

There remains ſtill a ſet of kindred trees, of the Order *Monadelphia*, and of a natural tribe entitled *Coniferæ* or *Cone-bearing*. Of theſe the Pine genus is chief: its generic characters are, that the ſtaminiferous flowers are diſpoſed in racemes, having each of them a four-leaved calyx; no corol, but abundance of ſtamens terminated by naked anthers: the

(*u*) Platanus orientalis *Lin.*
(*v*) Platanus occidentalis *Lin.*

piſtilliferous flowers are on a cone; each ſcale or calyx has two flowers, without any corol; one piſtil; and a nut furniſhed with a membranous wing.

The whole genus may be divided into the *Pines*, having two or more leaves from the ſame ſheathing baſe, and the *Firs*, having the leaves quite diſtinct at the baſe. Of the firſt diviſion, the moſt known among us is the *Scotch Pine* (*w*), or as it is vulgarly called *Scotch Fir*: this has two leaves in a ſheath; and the primordial ones ſolitary and ſmooth. It is by no means peculiar to Scotland, but is found all through Denmark, Norway, and Sweden, in Swiſſerland, and moſt other parts of Europe, and even in the Weſt Indies. The *Pineaſter* or *wild Pine* of Italy, the ſouth of France and Swiſſerland, reſembles this, but the branches are wider diſtant, and more horizontal; the leaves are larger, thicker, and longer, grow ſtraight, are of a darker green, and end obtuſely; the cones are ſeven or eight inches long: the leaves of the Scotch Pine are broader, greyiſh, and twiſted; the cones ſmall, and of a light colour: the timber alſo is far preferable, yielding the beſt red or yellow deal. Linnæus, however, does not ſeem to have diſtinguiſhed them. The *Stone Pine* (*x*) has

(*w*) Pinus ſylveſtris *Lin.*
(*x*) Pinus Pinea *Lin.*

alſo double leaves, and the primordial ones ſolitary, but fringed; they are of a glaucous hue: the cones are thick, roundiſh, and end obtuſely; the ſcales are flat, and the nuts ſo large, that in the South of France and Italy they think it worth while to break them, and ſerve the kernels up in deſerts. *Frankincenſe Pine* (*y*) has three leaves coming out of the ſame ſheath, and cones as large as thoſe of the Stone Pine, but more pointed, and with looſer ſcales, that open horizontally, and drop the ſeeds. The *Cembra Pine* (*z*) has five leaves in a ſheath; they are ſmooth, of a light green, long, and narrow; the cones are about three inches long, with cloſe ſcales, and large ſeeds eaſily broken. *Weymouth Pine* (*a*) has alſo five leaves in every ſheath, long and ſlender, but rugged on the edge; this tree grows remarkably ſtraight and tall, and the bark is very ſmooth. In North America it is called *White Pine*, and is excellent for maſts. The leaves of all theſe are linear and perſiſtent; Linnæus calls this ſort of leaf *aceroſe*.

Linnæus includes the *Cedar of Lebanon* (*b*) and *Larch* (*c*) in this genus; others ſeparate

(*y*) Pinus Tæda *Lin.*
(*z*) Pinus Cembra *Lin.*
(*a*) Pinus Strobus *Lin.*
(*b*) Pinus Cedrus *Lin.*
(*c*) Pinus Larix *Lin.*

them, becauſe the leaves are faſciculate, or come out in cluſters, ſpreading at top like a painter's bruſh: this circumſtance Linnæus gives for the ſpecific diſtinction, adding, that in the former they are acute, and in the latter obtuſe at the end; this is the only difference he mentions; the leaves of the Larch however are deciduous, thoſe of the Cedar perſiſtent or evergreen: the character alſo of theſe two trees is totally different—the latter ſpreading its vaſt arms horizontally till the ends hang down with their own weight, and having a faſtigiate or flat top—the former having the branches decreaſing from the bottom upwards, and being therefore nearly pyramidal.

Of the *Firs* properly ſo called, the *Pitch-tree*, or *Norway Fir* (*d*), and the *Spruce* (*e*), are the moſt common. The firſt has the leaves emarginate, or notched at the end: this is the tree from whence pitch is commonly extracted, and the wood of it is what we call white deal. The Spruce has awl-ſhaped, pointed, ſmooth leaves, turned two different ways; the timber of this reſembles the other, and when cut into boards is called by the ſame name. *Silver Fir* is ſo named from the whiteneſs of the leaves underneath; they are emarginate, and in ſhape

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(*d*) Pinus Picea *Lin.*
(*e*) Pinus Abies *Lin.*

much reſemble thoſe of the Yew: a great deal of turpentine is made from this. *Balm of Gilead Fir* (*f*) has the leaves ſubemarginate, or but little notched at the end; they are dotted in a double line underneath. There are many varieties, eſpecially of the Spruce, but it would lead us too far to notice them. I ſhall finiſh this knot of trees with the upright, the funereal *Cypreſs*, which has its ſtaminiferous flowers collected into an ovate ament, with one-flowered ſcales, and four ſeſſile anthers without filaments to each flower: the piſtilliferous flowers are in a roundiſh cone, eight or ten in number, one to each ſcale; theſe have many truncated points, hollow at the top, which are perhaps the ſtyles; under the ſcales of the cone lies an angled nut. *Common upright Cypreſs* (*g*) has imbricate leaves, with the leafing branches quadrangular: this takes naturally a cloſe pyramidal form, and when large has the fineſt effect imaginable near buildings. *Spreading Cypreſs* is only a variety of this, but grows to a very large ſize, and furniſhes the wood ſo famous for its durability, and reſiſtence to inſects. *Deciduous Cypreſs* (*h*) has the leaves in two ranks,

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(*f*) Pinus Balſamea *Lin.*
(*g*) Cupreſſus ſempervirens *Lin.*
(*h*) Cupreſſus diſticha *Lin.*

and ſpreading: it is a native of America, and grows to a vaſt ſize. But it is time to deſcend from trees to herbs, and thus put an end to this long letter.

The *ſtinging Nettles* (*i*) are to be found in the order *Tetrandria* of this claſs; but ſuch vulgar ill-humoured plants may forgive your paſſing them by, where you have ſo many intereſting and even great perſonages to attract your notice.

The immortal *Amaranth* however, having ſuperior elegance and beauty to boaſt, will not thus be paſſed unnoticed. It is of the order *Pentandria*, and having no corol, is ranged by ſome in the natural tribe of apetalous flowers. The ſame raceme or bunch bears incomplete flowers of both kinds, each of them having a three or five-leaved calyx; the one bearing three or five ſtamens, the other three ſtyles, and a one-celled capſule opening horizontally, with one ſeed only lodged in it. The ſpecies are numerous: one of the moſt known is the *Amaranthus tricolor*, cultivated for the beauty of its leaves, which are variegated with green, yellow, and red: this is one of thoſe that have three ſtamens to the flowers, which grow in roundiſh heads, are axillary, and ſurround the ſtem; the leaves are broad

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(*i*) Urtica *Lin.*

lance-ſhaped. *Amaranthus bicolor* (*k*) has only two colours in the leaves, an obſcure purple and bright crimſon: this reſembles the other, but has lance-ſhaped pointed leaves. *Prince's Feather* (*l*) has five ſtamens to the flowers, which are produced in decompounded, cylindric, long, pendulous racemes, of a bright purple, and two feet or more in length. *Tree Amaranth* reſembles this, but is ſeven or eight feet high: the racemes are thicker, but not ſo long. *Bloody Amaranth* (*m*) has alſo five ſtamens: the racemes are compound and erect, the ſide ones very ſpreading; the leaves are ovate-oblong: this has purple ſtalks and leaves; the racemes are ſhort, and at the end of the ſtem there is a large cluſter of them placed croſſwiſe, with one upright in the middle: the flowers are bright purple at firſt, but grow darker. Thus I have ſelected the moſt ſpecious of this fine genus for your examination: your gardener will furniſh you with them from the hot-beds, when he raiſes his annual flowers.

From the order *Polyandria*, I ſhall preſent you with two wild herbs—*Arrow-head* and *Burnet*. The firſt has many ſtaminiferous flowers, and a few with piſtils immediately

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(*k*) Amaranthus melancholicus *Lin.*
(*l*) Amaranthus caudatus *Lin.*
(*m*) Amaranthus ſanguineus *Lin.*

below them: both have a three-leaved calyx, and a corol of three petals: the one has about twenty-four ſtamens; the other many germs in a head, ending in very ſhort ſtyles, terminated by acute perſiſtent ſtigmas. Our *common Arrow-head* (*n*) is eaſily diſtinguiſhed by its leaves ſhaped like the head of an arrow, and pointed: it grows in the water, has rounded white petals with purple tails, and bears an evident affinity to *Water-Plantain*.

Burnet has incomplete flowers of both ſorts in the ſame ſpike; thoſe with ſtamens below the others: they have a four-leaved calyx, and a four-parted corol: the lower ones have from thirty to forty ſtamens; the upper, two piſtils, and a kind of berry formed from the tube of the corol hardened. *Common* or *ſmaller Burnet* (*o*) is diſtinguiſhed from the other ſpecies, by being unarmed or having no thorns; and the ſtems being rather angulate. This and the *Great Burnet* (*p*), though ſeparated ſo widely in the artificial ſyſtem, are evidently of the ſame natural genus: the calyx of the latter is two-leaved, the number of ſtamens only four, and one piſtil; both in the ſame flower: it is alſo a much larger plant, with not ſo many pairs of lobes to the leaves:

(*n*) Sagittaria ſagittifolia *Lin.*
(*o*) Poterium ſanguiſorba *Lin.*
(*p*) Sanguiſorba officinalis *Lin.*

this grows in moiſt meadows; the other in dry, eſpecially chalky paſtures.

Ricinus, or *Palma Chriſti*, ranges in the order *Monadelphia*. The flowers have no corol: ſome are furniſhed with many ſtamens, and theſe have a five-parted calyx; others have three bifid ſtyles, with a three-celled capſule, containing one ſeed in each cell; in theſe the calyx is three-parted. *Common Palma Chriſti* (*q*) has peltate, palmate leaves, toothed about the edge, of a glaucous hue underneath, and glands on the petioles. In the Weſt Indies there are ſeveral others, varying from this, and from each other; which are not, however, generally ſuppoſed to be diſtinct ſpecies. They call them *Agnus caſtus*, or *Oil-tree*, and extract from them an oil for their lamps; this is the *Caſtor Oil*, uſed in medicine. The common ſort grows in Sicily, and the other warm parts of Europe.

The order *Syngeneſia* of this claſs contains a ſet of plants that belong evidently to the ſame natural tribe, entitled *Cucurbitaceæ*, or *Gourd-plants*. They all agree in a one-leafed calyx, divided into five ſegments; a ſuperior, monopetalous corol, divided alſo uſually into five; three filaments; one ſtyle, generally trifid; and a *pomum* for a fruit.

(*q*) Ricinus vulgaris *Lin.*

Momordica is diſtinguiſhed principally by the elaſtic burſting of the fruit, which in the common ſort is hiſpid; the ſtalks of this have no tendrils. From the property of throwing out the ſeeds with the juice, this plant has acquired the name of *Spirting Cucumber* (*r*).

Gourd has the ſeeds of the fruit with a tumid margin. *Long Gourd* (*s*) has the leaves ſlightly angulate, downy, two-glanded underneath at the baſe; the flower white, on long peduncles, and reflexed at the brim; the fruit crooked, yellow when ripe, and the rind hard and woody, ſo that it will contain liquids; whence it is called *Bottle Gourd*.

Pompion, corruptly called *Pumpkin* (*t*), is of this genus, and has lobate leaves, with ſmooth fruits, which will grow to the ſize of a peck.

The *Squaſh* (*u*), which is another ſpecies, has alſo lobate leaves, erect ſtems, and the fruit flatted and knotty.

Warted Gourd (*v*) has likewiſe lobate leaves, and knobby fruits, as it were covered with warts. Theſe fruits differ much in their form and ſize.

(*r*) Momordica Elaterium *Lin.*

(*s*) Cucurbita lagenaria *Lin.*

(*t*) Cucurbita Pepo *Lin.*

(*u*) Cucurbita Melopepo *Lin.*

(*v*) Cucurbita verrucoſa *Lin.*

But the moſt known and cultivated of theſe fruits are the *Melon* and *Cucumber*, which belong to another genus, called *Cucumis*, having the ſeeds of the fruit ſharp. *Melon* (*w*) has the angles of the leaves rounded, and the fruits covered with little ſwellings: it varies much, as you know, in the form of the fruit. *Cucumber* (*x*) has the angles of the leaves ſharp, and the fruits oblong and rugged. All theſe having large flowers, with the parts very diſtinct, are proper to give you a juſt idea of this claſs; with theſe then I will finiſh, and releaſe you for the preſent.

(*w*) Cucumis Melo *Lin.*
(*x*) Cucumis ſativus *Lin.*

LETTER XXIX.

June the 1ſt, 1777.

THE twenty-ſecond claſs differs no otherwiſe from the preceding, than in the diſpoſition of the incomplete flowers, namely on different individuals of the ſame ſpecies; this is its eſſential character, and this gave occaſion to its name—*Dioecia*. There being no difficulty then in underſtanding this, which indeed has been repeated ſeveral times before; let us go on without farther preface to the examination of ſuch plants as are moſt likely to fall in our way *.

Such is the *Willow*, which is of the ſecond Order—*Diandria*. Both ſtaminiferous and piſtilliferous flowers are produced in aments or catkins, on different trees; ſo that you will have double trouble in examining the flowers of this claſs; for when you have found one ſort, you will have to look about, and perhaps have ſome difficulty in finding the other. In ſo delightful a ſtudy however, you will not grudge a little pains, after having already taken ſo much. The flowers of Willow have no corol, and their calyx is nothing but the ſcales of the ament; there is a little honied gland in the centre of each ſtaminiferous flower: you will eaſily know the other aments, by the ovate germ in each little flower, gradually leſſening to a pair of ſtyles, ſcarcely diſtinguiſhable from it, but by the two erect, bifid ſtigmas, with which they are terminated; this germ becomes a one-celled, two-valved capſule, containing many ſmall ſeeds, crowned with a rough ſimple down. There are anomalies in this genus; for one ſpecies has three, another five ſtamens, and a third has complete flowers. From more than thirty ſpecies, I ſhall ſelect the *White Willow* (*y*), which is a tree ſo common in watery ſituations: you will know it by the lance-ſhaped, acuminate leaves, toothed about the edges, pubeſcent, or villous, on both ſurfaces, and having the lower ſerratures glandulous: the leaves are very white underneath; and the catkins are ſhort and thick: it will grow to be a large tree, when it is not headed. Several ſpecies are commonly cultivated in Oſier-holts (*z*), but being always kept down, in order to have a conſtant ſucceſſion of long, ſlender twigs, you will have little opportunity of

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* The genera in this claſs are 55, and the ſpecies 319.

(*y*) Salix alba *Lin.*

(*z*) Salix vitellina, amygdalina, purpurea, viminalis, &c. *Lin.*

examining their fructification. But one ſpecies being cultivated for its beauty, which fortunately depends upon the natural growth, you may ſtudy it at your leiſure: this is the *Weeping Willow* (*a*), known at firſt ſight by its long, ſlender, pendulous branches; the leaves are ſmooth, narrow, and linear, tending to lance-ſhaped. *Common Sallow* (*b*) has ovate leaves, wrinkled on the ſurface, which is villous above and tomentoſe or nappy underneath, and ſlightly toothed or waved on the edges. There are ſeveral varieties of this vulgar ſpecies.

Miſſeltoe is of the order *Tetrandria*, its paraſitic quality you are well acquainted with, and that alone makes it generally obvious to every body: it is however no part of its character. The genus is determined by a four-parted calyx, and an anther growing to each part, without a filament, in the ſtaminiferous flowers: a four-leaved calyx ſitting on the germ; no ſtyle; and a berry incloſing one heart-ſhaped ſeed in the others; neither have any corol. *Common* or *White Miſſeltoe* (*c*) is diſtinguiſhed from the reſt of the ſpecies by lance-ſhaped leaves ending obtuſely, a dichotomous ſtalk, and axillary ſpikes of flowers.

(*a*) Salix babylonica *Lin.*
(*b*) Salix caprea *Lin.*
(*c*) Viſcum album *Lin.*

In the next order *Pentandria*, we have Spinach, Hemp, and Hop. The firſt has a five-parted calyx in the ſtaminiferous flowers, and a quadrifid or four-cleft one in the others; theſe have four-cleft ſtyles, and one ſeed within the indurated calyx. Linnæus ſeparates the *garden* (*d*) ſort from the *Siberian* (*e*), by the ſeeds being ſeſſile, which in the latter are peduncled: of the former are ſeveral varieties; two remarkable ones, which perhaps may be diſtinct, the one having ſagittate leaves, and prickly ſeeds; the other rather ovate leaves, with ſmooth ſeeds.

Hemp (*f*) has a five-parted calyx in the flowers which bear ſtamens, but in the piſtilliferous ones it is one-leafed, entire, and gaping on the ſide; theſe have two ſtyles, and the ſeed is a bivalve nut within the cloſed calyx. There is only one known ſpecies, and therefore until others are diſcovered, there is no occaſion for any ſpecific diſtinction.

Hop (*g*) has a five-leaved calyx in the ſtaminiferous flowers; in the others it is one-leafed, obliquely expanding and entire; theſe have two ſtyles, and one ſeed within a

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(*d*) Spinacia oleracea *Lin.*
(*e*) Spinacia fera *Lin.*
(*f*) Cannabis ſativa *Lin.*
(*g*) Humulus Lupulus *Lin.*

leafy calyx: many of them are collected together to form what we call the Hop. In the three laſt genera the flowers have no corol.

The Order *Hexandria* has the *Tamus* or *black Bryony*, the flowers of which have a ſix-parted calyx and no corol; the piſtilliferous flowers have a trifid ſtyle, and a three-celled berry below the flower, containing two ſeeds: our common ſpecies (*h*) has heart-ſhaped undivided leaves.

The *Poplars* are in the Order *Octandria*. The flowers of both ſorts are here born on ſimilar aments, conſiſting of ſcales torn on the edge, and each having one flower, without any petals, but a top-ſhaped nectary ending obliquely above in an ovate border: the piſtilliferous flowers have a quadrifid ſtigma, and are ſucceeded by a two-celled capſule, containing many downy ſeeds. *White Poplar* (*i*) has roundiſh leaves indented on the edges into angles, and downy underneath. *Great White Poplar* or *Abele-tree*, is a variety of this, with larger leaves, more divided, and of a darker green. *Trembling Poplar* or *Aſp* (*k*) has leaves like the former in ſhape, but ſmooth on both ſides; theſe being ſet on long petioles that are flatted at the tip, trem-

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(*h*) Tamus communis *Lin.*

(*i*) Populus alba *Lin.*

(*k*) Populus tremula *Lin.*

ble with the ſlighteſt breeze. *Black Poplar* (*l*) has rhomboid leaves, pointed and toothed; they are ſmooth on both ſides, of a light green; and the catkins are ſhorter than thoſe of the two former. *Carolina Poplar* (*m*) has very large heart-ſhaped leaves, obtuſely notched about the edges; and the ſhoots angled. *Tacamahaca* (*n*) is a ſpecies of Poplar, with oblong-ovate leaves, toothed about the edges, white underneath, with a ſcarcely viſible down, and the veins forming a fine net work: the ſtipules are remarkably reſinous.

Of the Order *Enneandria* there is an herb, frequent under hedges and in woods, called *Dog's Mercury* (*o*): the flowers have a three-parted calyx, and no corol; in ſome there are nine or twelve ſtamens, with globular, twin anthers; in others, on a diſtinct plant, two ſtyles, and a two-grained, two-celled capſule, containing one ſeed in each cell. The ſpecies here meant is diſtinguiſhed from the reſt by its very ſimple unbranched ſtem, and its rough leaves.

In the Order *Monadelphia* you will find a genus of trees under the title of *Juniper*, including not only the Juniper properly ſo called, which is rather a ſhrub than a tree,

(*l*) Populus nigra *Lin.*

(*m*) Populus balſamifera *Miller.* angulata.

(*n*) Populus balſamifera *Lin.*

(*o*) Mercurialis perennis *Lin.*

but alſo the Savin, and American or Sweet Cedars, &c. The ſtaminiferous flowers in this genus are born on an ament, the ſcales of which form the calyx of each flower, having no corol but only three ſtamens: the piſtilliferous flowers have a ſmall, perſiſtent, three-parted calyx, growing to the germ, which is below the flower; they have a corol of three petals, three ſtyles, and a three-ſeeded berry, with three tubercles of the unequal calyx on the lower part, and three little teeth at top from the remains of the petals. *Common Juniper* (*p*) has three ſpreading, pointed leaves coming out together, that are longer than the berry. *Savin* (*q*) has oppoſite, erect, decurrent leaves, with the oppoſitions boxed or running over each other along the branches, they are ſhort and acute: this ſhrub ſpreads out much horizontally, riſing little in height. There are ſeveral ſpecies of *Cedar* natives of America. *Bermudas Cedar* (*r*) is that which is imported for caſing black lead in pencils, was formerly uſed for wainſcotting rooms, and now for ſhips in the Weſt Indies, the worms not attacking this kind of wood. The ſpecific diſtinction is from the leaves; the lower ones being threefold, the upper twofold (*s*), de-

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(*p*) Juniperus communis *Lin.*

(*q*) Juniperus Sabina *Lin.*

(*r*) Juniperus bermudiana *Lin.*

(*s*) Miller ſays fourfold and imbricate.

current, ſubulate, ſpreading and acute. The plantations have alſo the *Red Virginia* (*t*), *Carolina*, and *Barbados* (*u*) *Cedars*; and there are others which are natives of the ſouthern parts of Europe (*v*).

The baleful *Yew* (*w*) is of the ſame Order: the flowers have no corol, nor properly ſpeaking any calyx, unleſs we allow the three or four-leaved bud to be ſuch: on ſome trees they will be found to have many ſtamens, terminated by peltate, eight-cleft anthers; on others, to have an ovate, pointed germ, ending in an obtuſe ſtigma without any ſtyle, the germ becoming a kind of berry, or rather ſucculent receptacle, with one ſeed in it having the top naked: theſe flowers all come out from the *alæ* of the leaves, which are linear, end in a ſharp point, and are ranged in a double row cloſe together along the mid-rib; the berry is red and mawkiſhly ſweet—not poiſonous, though the leaves certainly are ſo.

I will now finiſh our examination of this Claſs, and cloſe this letter, with the ſingular genus of *Ruſcus*, the flowers of which have a ſix-leaved calyx, no corol, but an ovate inflated nectary, perforated at top, in the centre

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(*t*) Juniperus virginiana *Lin.*

(*u*) Juniperus barbadenſis *Lin.*

(*v*) Juniperus thurifera, phoenicia, Lycina, Oxycedrus *Lin.*

(*w*) Taxus baccata *Lin.*

centre of the flower: the ſtaminiferous flowers have no filaments, but only three anthers, ſitting on the top of the nectary, and united at the baſe, whence this genus is of the Order *Syngeneſia:* the piſtilliferous flowers have one ſtyle, and a germ hid within the nectary, which becomes a globoſe, three-celled berry, containing two globoſe ſeeds. The common ſpecies, which we call *Butcher's-broom* or *Knee Holly* (*x*), bears its flowers in the middle of the leaves, on their upper ſurface; theſe are of the ſhape and ſize of myrtle leaves, but ſtiffer, and end in prickly points; the berries are red, and almoſt as large as Cherries: in another ſpecies (*y*) the flowers are produced on the under ſurface of the leaves: in a third (*z*) they are produced alſo underneath, but are protected by a leaflet, whereas in the other ſpecies they are naked: a fourth (*a*) flowers from the margin of the leaves: and the *Alexandrian Laurel* (*b*), which is a ſpecies of *Ruſcus*, from long racemes at the ends of the branches; the flowers of this are complete, and therefore the plant ought not to be found in this Claſs, but ſince it is evidently of this genus naturally, Linnæus has

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(*x*) Ruſcus aculeatus *Lin.*

(*y*) Ruſcus Hypophyllum *Lin.*

(*z*) Ruſcus Hypogloſſum *Lin.*

(*a*) Ruſcus androgynus *Lin.*

(*b*) Ruſcus racemoſus *Lin.*

has left it with its own family, chooſing rather to violate the laws of his own arbitrary ſyſtem, than thoſe of nature. The ſtalks of this are ſlender and pliable; the leaves are rounded at the baſe, but end in acute points, they are ſmooth, and of a very lucid green; the flowers are of an herbaceous yellow colour, and are ſucceeded by berries like thoſe of our Butcher's-broom, but ſmaller. With this beautiful evergreen I leave you, dear Couſin, 'till the next letter.

LETTER XXX.

June the 14th, 1777.

THERE are ſome perſons, dear Couſin, who think the twenty-third Claſs—*Polygamia*, might have been ſpared, and the plants compriſed in it * ranged in the other Claſſes, according to the number, ſituation, proportion, &c. of the ſtamens. But let us take things as we find them, without enquiring too deeply into the merits, of what after all is of no great importance. The eſſence of this Claſs conſiſts in having complete flowers, accompanied by one or both ſorts of incomplete ones, either on the ſame or different individuals. The latter circumſtance furniſhes the character of the three Orders.

The firſt Order of this Claſs having the complete and incomplete flowers always on the ſame plant, is hence entitled *Monoecia*. You may perhaps remember, that ſome of the Graſſes were ſaid to be of this Order (*c*); here alſo are the *Plantain-tree* and *Banana* (*d*); *Valantia* or *Croſswort*, which you may find in hedges and buſhy places, and will evidently perceive to be of a natural tribe (*e*) you have met with before : there is uſually one complete flower in this genus, accompanied on each ſide with an incomplete ſtaminiferous one ; the former has the corol four-parted, four ſtamens, a bifid ſtyle, and one ſeed ; the latter have the corol trifid in ſome ſpecies, quadrifid in others ; three ſtamens in ſome, four in others, and an obſcure piſtil ; none of the flowers have any calyx : frequently theſe plants produce incomplete flowers only, and therefore no ſeed ; owing I preſume to their running ſo much at the root. Our wild ſpecies (*f*) is one of thoſe which have the incomplete flowers quadrifid, and it has two leaves to each peduncle, which ſupports about eight flowers, with yellow corols ; there are four leaves to each whorl, and they with the whole plant are covered with ſoft hairs.

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* Genera 34, ſpecies 224.

(*c*) See Letter XIII. p. 157.

(*d*) Muſa paradiſiaca & ſapientum *Lin.*

Pellitory of the Wall has two complete flowers, with one piſtilliferous flower between them, within a ſix-leaved involucrum ; they have a four-cleft calyx, no corol, one ſtyle, and one ſeed : the complete flowers are diſtinguiſhed by having four ſtamens ; the other has none. Our common ſpecies (*g*) has broad lance-ſhaped leaves, di-

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(*e*) *Stellatæ* : ſee Letter XV. p. 169.

(*f*) Valantia Cruciata *Lin.*

(*g*) Parietaria officinalis *Lin.*

chotomous or forked peduncles, and two-leaved calyxes: the piſtilliferous flowers are quadrangular and pyramidal.

Atriplex or *Orache* has ſuch affinity with *Chenopodium* or *Gooſefoot* *, that, as Linnæus obſerves, if Orache had only complete flowers it would be a Gooſefoot; and if this had piſtilliferous flowers, it would be an Orache. Moſt of theſe are common weeds on dunghills, or on the ſea coaſt.

Acer or *Maple* is a tree in which you may examine the character of the Claſs and Order at your eaſe. The flowers are produced in bunches; the lower ones complete, and thoſe which are towards the end ſtaminiferous: they have a quinquefid calyx, a corol of five petals; the complete flowers have beſides all this one piſtil, and two or three capſules, joined at the baſe, flat, each terminating in a large, membranaceous wing, and containing one ſeed. The *Great Maple* commonly called *Sycomore* (*h*), has five-lobed leaves unequally ſerrate, and the flowers in large racemes. *Common Maple* (*i*) has lobed leaves, obtuſe and emarginate; generally they are divided half way into three lobes, the ſide ones obtuſely ſemibifid, the middle one ſemitrifid; the upper leaves rather cut into five lobes: the bunches of flowers are ſmaller. This tree grows much in hedges.

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* See p. 228.

(*h*) Acer Pſeudoplatanus *Lin.*

(*i*) Acer campeſtris *Lin.*

The famous *Mimoſa* or *Senſitive* belongs to this firſt Order of the Claſs Polygamia. The flowers have a five-toothed calyx, a five-cleft corol, and five or more ſtamens: the complete flowers have alſo one piſtil, and a legume for a ſeed-veſſel. This genus is very numerous, but all the ſpecies are not endued with the ſenſitive quality. That which is moſt common in the iſlands of the Weſt Indies and our ſtoves (*k*), has the ſtems armed with ſhort recurved ſpines; pinnate leaves compoſed of four or five pair of lobes, whoſe baſe join at a point where they are inſerted into the petiole, ſpreading upwards like the fingers of the hand; the flowers come out from the *alæ* on ſhort peduncles, in ſmall globular heads, the corols are yellow; they are ſucceeded by ſhort, flat, jointed pods, with two or three orbicular, bordered, compreſſed ſeeds in each. Some ſpecies move much more readily than others; ſome drop the lobes of the leaves only, and others drop the petioles of the whole leaf alſo. The *true Egyptian Acacia* (*l*), and many other Acacias, having the ſame characters, are included in this genus: they are too tender to flower much in our climate.

(*k*) Mimoſa pudica *Lin.*

(*l*) Mimoſa nilotica *Lin.*

Three-thorned Acacia (*m*) is of another genus, and indeed of another Order—*Dioecia:* for it has the ſtaminiferous flowers in a long, compact, cylindric ament, with ſome complete ones generally at the end of it; and on a diſtinct plant piſtilliferous flowers on looſe aments. The complete flowers have a quadrifid calyx, a four-petalled corol, ſix ſtamens, one piſtil, and a legume: the ſtaminiferous flowers have a three-leaved calyx, a corol of three petals, and ſix ſtamens: and the piſtilliferous flowers have a five-leaved calyx, a five-petalled corol, one piſtil, and a legume. The common ſpecies is diſtinguiſhed from the other (*n*) by its large thorns, which have generally two ſmaller ones, coming out from the ſide; they are axillary, and are often produced in cluſters at the knots of the ſtem: the leaves are pinnate, and have ten pair of ſmall lobes. In America, its native country, this tree is called *Honey Locuſt.*

The *Aſh-tree* is alſo of this ſecond Order: having on ſome trees complete flowers, on others piſtilliferous ones, each frequently accompanied by the others; they have either a four-parted calyx or none, a corol of four petals or none, and one

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(*m*) Gleditſia triacanthos *Lin.*

(*n*) Gleditſia inermis *Lin.*

piſtil: the complete flowers have alſo two ſtamens, and one lance-ſhaped ſeed. *Common Aſh* (*o*) has pinnate leaves with five pair of lobes, ſlightly ſerrate on the edge; the flowers have neither calyx nor corol, and are produced in looſe bunches from the ſides of the branches. *Flowering Aſh* (*p*) has the lobes of the leaf ſerrate; the flowers are furniſhed both with calyx and corol; and are in large looſe bunches at the ends of the branches. The *American* or *Carolina Aſh* (*q*) has the lobes quite entire, and the petioles round.

Of the third Order—*Trioecia*, we have the *Fig*, which though it bears flowers that are viſible, yet conceals them within the fruit, and therefore may lead us well enough to the Claſs *Cryptogamia*. What we call the fruit of the Fig, Linnæus names the receptacle, or common calyx of the flowers; he deſcribes it as being top-ſhaped, fleſhy, converging, cloſed at the broad end with ſeveral ſcales, and having the inſide covered with little flowers, complete and incomplete; ſometimes in the ſame fruit, and ſometimes on different trees; the ſtaminiferous flowers have a three-parted calyx, and three ſtamens; the piſtilliferous flowers have a five-

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(*o*) Fraxinus excelſior *Lin.*
(*p*) Fraxinus Ornus *Lin.*
(*q*) Fraxinus americana *Lin.*

parted calyx, one piſtil, and one roundiſh, flatted ſeed; neither of them have any corol. Our *common* or *eatable Fig* (*r*) is diſtinguiſhed by its palmate leaves: the different fruits are but varieties ariſing from the ſame ſeed. The hiſtory and œconomy of this ſingular tree, as related by naturaliſts and travellers, will be an agreeable relaxation to you, amidſt our dry botanical diſquiſitions.

(*r*) Ficus Carica *Lin.*

LETTER XXXI.

June the 21ſt, 1777.

HAVING now gone through all the Claſſes of conſpicuous flowers, we ſhould regularly proceed to the laſt Claſs of the Syſtem, in which they are inconſpicuous; but having kept on a ſtraight courſe for a long time, we will now turn out of it, and take a view of the different appearances which the nectary puts on, in the ſeveral genera of plants wherein it is found.

Several of theſe have been curſorily mentioned as characters of the genus: and we have even hinted at the general uſe of the nectary (*s*): but we ſhall now go farther, and ſay, that though this part of the flower has not hitherto been obſerved in two hundred genera (*t*), yet that in all probability it exiſts in all, if not as a diſtinct viſible part, as a gland or pore however, or a ſet of glands or pores, exuding that viſcid, ſweet juice, ſo uſeful ſecondarily for the nouriſhment of a great variety of inſects, and at the ſame time doubtleſs primarily neceſſary to the fructification of the plant itſelf. For you will obſerve in monopetalous tubular corols,

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(*s*) See Letters IV. and XVII.

(*t*) Beſides the Graſſes.

that though they have no viſible nectary, yet there is a nectareous juice ſecreted into their tube (*u*), which is therefore probably provided with glands for this purpoſe, too minute to be ſeen with the naked eye, but which an accurate inſpection with glaſſes might perhaps detect. Polypetalous flowers with open calyxes, having no tube, or baſin for the reception of the nectareous juice, have in general a body deſtined to prepare and contain it, in order that it may be diſtributed to the ſurrounding parts of fructification, as it is wanted. In the Compound and Umbellate tribes of plants indeed no nectaries have been remarked, but then you remember, that the whole flower in both of them is ſo ſmall, that it is no wonder if a part ſo minute as the nectary frequently is in larger flowers, ſhould eſcape our obſervation in theſe: we may preſume however that they abound in nectareous juice, ſince we obſerve that inſects are particularly fond of theſe two tribes. No genus of the Claſs Icoſandria has any diſtinct nectary; but then the calyx is one-leafed, and forms a commodious baſin for the reception of the nectareous juice, which is frequently very diſcernible in it. The Verticillate tribe (*v*) alſo is not mentioned by Linnæus as being

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(*u*) As particularly in the Honeyſuckle and Aloe.

(*v*) Didynamia Gymnoſpermia *Lin.*

furniſhed with viſible nectaries; nor are they perhaps immediately neceſſary here, becauſe the corol is monopetalous, and the monophyllous calyx forms a perſiſtent tube: many genera however of this Order have a gland in the bottom of the calyx, ſurrounding the baſe of the germ; this is large in the *Bugle*, and ſufficiently viſible in the *Dead Nettle*.

No appearance of the nectary is more common than this of glands. You have already ſeen (*w*) that they are conſiderable in ſeveral genera of the Cruciform tribe; that they have furniſhed us with generic characters: and that they are even the cauſe of the claſſical character itſelf (*x*). It has been juſt mentioned, that they are found in the Verticillate or Labiate tribe: and many genera diſperſed in various parts of the ſyſtem, have this glandular nectary. Thus *Plukenetia* (1084) *(y)* has four glands at the baſe of the filaments, as in the Claſs *Tetradynamia*. *Cercis* (510) has a ſtyle-form gland under the germ. *Lathræa* (743) and *Orobanche* (779) have a gland at the baſe of the germ. *Caſſyta* (505) has three glands; *Echites* (299) and *Tabernæmontana* (301) have five; *Hernandia* (1049) has ſix or four, ſurrounding

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(*w*) Letter XXIII.

(*x*) See Letter II. p. 32. Letter IV. p. 43. Letter V. p. 51. compared with Letter XXIII.

(*y*) The figures refer to the number of the genus in Linnæus's Genera and Syſtema.

rounding the germ; and *Grielum* (1235) has a ſet of oblong glands, round the germ, uniting into a little crown. *Malpighia* (572) has two glands, at the bottom and on the outſide of each leaf of the calyx: in *Baniſteria* (573) the caſe is the ſame, except that one foliole of the calyx has no glands, and therefore the whole number is eight; whereas in the other it is ten. *Reſeda* (608) has a gland ariſing from the receptacle, between the ſtamens and the upper petal: and *Croton* (1083) has five of them, fixed to the receptacle. *Aſtronium* (1111) has five glands in the diſk of the flower. *Cucurbita* (1091) or the Gourd genus, has a ſingle, triangular, concave gland in the centre of the flower: and in the *Salix* (1098) or *Willow* the ſituation is the ſame, but the form of it is cylindric.

Another very uſual form of the nectary is ſcales, which are in truth but flatted glands. *Monnieria* (850), and *Vicia* (873) or the Vetch genus, have one ſcale only, at the baſe of the germ. *Cuſcuta* (170) or *Dodder*, has four ſcales, at the baſe of the ſtamens. But many have five ſcales: as *Parnaſſia* (384); at the baſe of the filaments in *Schrebera* (319), *Quaſſia* (529) and *Melaſtoma* (544); between the ſtamens in *Ireſine* (1113); at the baſe of the germ, in *Craſſula* (392) *Cotyledon* (578) and *Sedum* (579); ſurrounding the receptacle, in *Samyda* (543);

or at the baſe of the petals, in *Erythroxylon* (575) *Ranunculus* (699) *Grewia* (1026) and *Kiggelaria* (1128). *Amaryllis* (406) and *Leontice* (423) have ſix ſcales; without the baſe of the filaments in the firſt, and inſerted into the baſe of the petals in the ſecond.

Not unfrequently does the nectary appear in the ſhape of valves, which are generally five in number; in *Plumbago* (213) placed at the bottom of the corol, and incloſing the germ; ſurrounding the germ in *Achyranthes* (288); and covering the receptacle in *Campanula* (218) and *Roella* (219). *Aſphodel* (421) has ſix of theſe valves, inſerted into the baſe of the corol, and forming a complete arch over the germ; a filament ſpringing from each of them.

In *Erythronium* (414) there are two callous tubercles at the baſe of each inner petal; in the *Laurus* (503) genus (z), three tubercles round the germ; and two round glands, on a ſhort ſtalk, near the baſe of each filament of the inner rank. In ſome ſpecies of *Iris* there are three dots (*a*) at the baſe and on the outſide of the corol; in *Tamus* (1119) an oblong dot grows to the inſide of each diviſion of the calyx; and in another genus *Swertia* (321) are ten of theſe dots; two at the baſe of each diviſion of the corol, ſurrounded with briſtles. In the *Hyacinth* (*b*) (427) there are three pores at the top of the germ: and in both the genera of *Fritillaria* (411) and *Uvularia* (412) there is an excavation at the baſe of each petal: in the *Crown Imperial* this is conſiderable, and generally exhibits a large drop of nectareous juice. *Mercurialis* (1125) (*c*) has two ſubulate *acumens* or ſharp points, one on each ſide of the germ; and *Valliſneria* (1097) has a *cuſpis* on each petal.

(z) See Letter XIX.

(*a*) Puncta.

You remember the beautiful appearance that the nectary made in ſome ſpecies of *Iris* (*d*), as a longitudinal villous line upon the petals: in the *Lily* (410) it is a pipe or tubulous line along the middle of each petal: and in *Frankenia* (445) it is a channel running along the tail.

In ſome genera the nectary takes the exact form of petals, and was always confounded with them, until Linnæus pointed out the difference: this is the caſe with ſeveral plants of the firſt Claſs (*e*), and with *Lecythis* (664) in the thirteenth; in all theſe it is of one petal only: in *Galanthus* (401) or *Snowdrop*, it conſiſts of three parallel, notched,

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(*b*) Our wild Hyacinth (H. non ſcriptus) has not theſe pores, or at leaſt they are not viſible to the naked eye.

(*c*) Letter XXIX.

(*d*) Page 162.

(*e*) Page 123.

obtuſe, petal-like leaflets, forming a cylinder about half the length of the corol. *Illicium* (611) has ſeveral awl-ſhaped folioles of the ſame length with the petals themſelves. *Cardioſpermum* (498) has a four-petalled nectary incloſing the germ; and in *Hartogia* (273) *Sauvageſia* (286) and *Heliſteres* (1025) it is made up of five petals. *Andrachne* (1095) has five ſemibifid herbaceous folioles, leſs than the petals and placed between them. All the *Graſſes*, *Rice* (448) and *Mays* (1042) agree in having a nectary of two minute, oblong leaflets. , *Swietenia* (521), *Melia* (527) and *Melianthus* (795) have a one-leafed nectary, with a many-toothed mouth in the two firſt, and in the laſt within the loweſt diviſion of the calyx, to which it grows. In *Muſa* (1141) alſo, the nectary is one boat-ſhaped leaf, compreſſed, pointed, and inſerted within the boſom of the petal. Ten connivent leaflets, incloſing the germ, form the nectary of *Zygophyllum* (530); each leaflet being fixed to the baſe of each filament. *Dalechampia* (1081) has a broad nectary, compoſed of many ovate, flat plates, in ſeveral rows.

I have mentioned before, that in tubulous corols, the nectareous juice is ſecreted into the tube: in many genera there is a horn or ſpur at the back of the flower, which anſwers this purpoſe of a recipient. Several plants have occurred in the courſe of our examinations with a nectary of this form; as *Tropæolum* (466) *Larkſpur* (681) *Aconite* (682) *Columbine* (684) *Antirrhinum* (750) *Fumitory* (849) *Violet* (1007) *Impatiens* (1008) and *Orchis* (1009) *(f)*: to theſe we may add *Pinguicula* (30) or *Butterwort*, *Utricularia* (31) and *Valerian* (44). In ſome ſpecies of Antirrhinum the horn is blunted; and becomes rather a bag; which is alſo its ſhape in the *Satyrium* genus (1010). The genera of this tribe are remarkable for their nectaries; in *Ophrys* (1011) it hangs down from the corol, longer than the petals, and is keeled at the back part; in *Serapias* (1012) it is of the ſame length with the petals, ovate, gibbous below, and with an ovate lip; in *Limodorum* (1013) it is of the ſame length with the petals, of one leaf, concave, ſtanding on a pedicle, and within the loweſt petal; in *Arethuſa* (1014) it is of one leaf, tubulous, at the bottom of the ringent corol, and connate with it; in *Cypripedium* (1015) or *Ladies-Slipper*, as you have ſeen before *(g)*, it is very large and inflated; and in *Epidendrum* (1016) it is tubulous at the baſe, turbinate or top-ſhaped, with an oblique, bifid mouth. Thus you obſerve that all the genera of this tribe have ſingular nectaries; whereas in the three Claſſes with

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(f) See pages 263, 303, 318, 349, 409 and 412.
(g) Letter XXVII.

conjoined filaments ſcarcely any are to be found (*h*). The numerous genus of *Carex* (1046) or *Sedge* has an inflated, perſiſtent nectary, contracting above, and toothed at top, where it gapes, but continues to inveſt the ſeed; in *Ruſcus* (1139) alſo it is inflated and open at top, it is ovate, erect, and of the ſame ſize with the calyx.

In many genera the nectary takes the form of ſome well-known utenſil or other thing. Thus in *Staphylæa* (374) *Tinus* (504) *Winterana* (598) and *Urtica* (1054) or Nettle, it is *Urceolate* or *Pitcher-ſhaped*. In *Narciſſus* (403) and *Pancratium* (404) it is *Funnel-ſhaped*. In *Epimedium* (148) it is *Cyathiform* or *Goblet-ſhaped*. In *Byttneria* (268) *Theobroma* (900) or *Chocolate*, *Ayenia* (1020) and *Kleinhovia* (1024) it is *Bell-ſhaped*. In *Ciſſampelos* (1138) it is *Wheel-ſhaped*: and in *Epidendrum* (1016) *Poplar* (1123) and *Gleditſia* (1159) it is *turbinate*, or ſhaped like a boy's top, narrow at bottom and ſpreading out above. The moſt beautiful of theſe nectaries is the *Crown-ſhaped*: in *Dioſma* this is placed on the germ; in *Olax* (45) *Hamamelis* (169) *Nerium* (297) or *Oleander*, *Periploca* (303) *Silene* (567) and *Cherleria* (570) it terminates the tube of the corol: but in the *Paſſion-flower* (1021) it is a triple Crown or

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(*h*) In *Monadelphia* and *Polyadelphia* only one in each; and in *Diadelphia* three.

Glory, the outer one longeſt, ſurrounding the ſtyle.

In *Garidella* (571) *Nigella* (685) and *Hellebore* (702) the nectaries are bilabiate; the firſt has five, the ſecond has eight, and the third has an uncertain number. *Trollius* (700) has nine linear, flat, bent bodies, perforated at the baſe, on the inſide; and *Iſopyrum* (701) has five equal, tubulous, ſhort nectaries, with a trilobate mouth, inſerted into the receptacle, within the petals.

In *Arum* (1028) the nectaries reſemble the filaments of ſtamens, only that they thicken at bottom; they come out in two rows from the middle of the ſpadix. In *Peganum* (601) the filaments themſelves are dilated into nectaries at the baſe. In *Fevillea* (1118) they conſiſt of five compreſſed, bent threads, placed alternately with the ſtamens. In *Trichilia* (528) the nectary is cylindric, and tubulous, formed out of the ten filaments, ſhorter than the petals, and with a five-toothed mouth.

You have obſerved that many nectaries already mentioned have an intimate connection with the germ; it is a ſituation ſo common with this part of the flower, that ſome perſons have ſuſpected the ſole or principal uſe of it to be to ſupple and foſter the germ. Accordingly there are ſeveral other genera, in which it is thus placed. In *Mirabilis* (242) or *Marvel of Peru* it is globoſe, perſiſtent, and incloſes the germ: in *Ciſſus* (147), *Celoſia* (289), *Limeum* (463), and *Phyllanthus* (1050), it is a ring ſurrounding the germ: in *Cynanchum* (304), it is cylindric, with a five-toothed mouth; in *Apocynum* (305), *Aſclepias* (306), and *Stapelia* (307), it is made up of five bodies, which in the ſecond and third entirely conceal the ſtamens and piſtils, and in the third forms a double ſtar: all of them about the germ. In *Gualtheria* (551) it is made up of ten ſhort, awl-ſhaped, erect bodies, ſurrounding the germ, between the ſtamens.

It muſt not be diſſembled however, that whatever uſe theſe bodies may be of to the germ, when they adhere to it, or are near it; they are frequently found on other parts of the fructification. Many inſtances of this have already occurred, and to theſe we may add, that they are found on the petals in *Bromelia* (395), growing to each of the three, above the baſe; in *Berberis* (442), or the *Barberry*, in two roundiſh orange-coloured bodies at the baſe of each; in *Hermannia* (828), each petal having a little membrane, forming all together a cowled tube; in *Hydrophyllum* (204), and *Reaumuria* (686), in *laminæ* or plates growing to them; in *Myoſurus* (394), being five awl-ſhaped bodies. The nectary is found on the calyx in *Tropæolum* mentioned before, in *Monotropa* (536), in ſome ſpecies of *Biſcutella* (808), (808), and in *Malpighia,* mentioned alſo before among thoſe which have glandular nectaries. This part is a globoſe gland on the exterior tip of the anthers in the *Adenanthera* (526), at the baſe of them in *Ambroſinia* (1238); and on the filaments in form of glands in *Dictamnus* (522), in form of ſcales in *Zygophyllum* (530), placed horizontally on the real filaments in *Commelina* (62); and in *Plumbago, Campanula* and *Roella,* mentioned before. And laſtly, the nectaries are not unfrequently placed on the receptacle; as in *Lathræa* (743), *Clutia* (1140), *Melianthus* (795), and ſome others: but theſe are ſo cloſe to the germ, which takes its riſe from the ſame baſe, that they may very well be ſuppoſed to be placed there for its uſe.

But what ſhall we ſay, when we find the nectary, in the incomplete ſtaminiferous flowers, which have no germ; as in *Willow* (1098), *Aſtronium* (1111), *Ireſine* (1113), *Fevillea* (1118), *Poplar* (1123), *Rhodiola* (1124), *Kiggelaria* (1128), *Ciſſampelos* (1138), *Ruſcus* (1139), *Clutia* (1140), and *Ophioxylon* (1142). In all theſe caſes, it certainly cannot be of any immediate uſe to the germ, which is not only in a diſtinct flower, but on a different plant: this however being the moſt important part of the vegetable, ſince it is deſtined by nature to produce a new one of the ſame kind; and all the other parts of the flower being in ſome meaſure ſubſervient to this, whatſoever is immediately uſeful to theſe, may fairly be ſaid to be mediately ſerviceable to the germ.

But let us return to our hiſtory of facts, and finiſh this dry diſcuſſion, which I ſhould not have troubled you with, if I could have directed you to any author, where you might find the different forms and ſituations of the nectary regiſtered in one view.

Hitherto you have obſerved that this beautiful part of the flower is generally ſingle, though in many caſes formed of ſeveral portions: in ſome genera however it is double. Thus in *Krameria* (161), there are two nectaries, one above another; in *Stapelia*, as you have already ſeen, a double ſtar, both flat and quinquefid, the lower with linear diviſions torn at the end, ſurrounding the ſtamens and germs, the upper with acute, entire diviſions covering them: ſomething of the ſame kind is obſervable alſo in *Aſclepias*, the very ſingular ſtructure of whoſe flowers is particularly deſerving of your attention. *Paullinia* (497) alſo, and *Sapindus* (499) have two nectaries, very different from each other; the one conſiſting of four petals inſerted into the tails of the real petals, the other of four glands at their baſes. I may here obſerve, that though the general uſe of the nectary, as the name implies, be to pour out the nectareous juice; yet it does not ſeem that all the bodies to which Linnæus has given the name, ſerve that purpoſe: ſuch may probably be the caſe in one of theſe nectaries of the genera before us, and perhaps of others, where this part is double. Laſtly, *Clutia* (1140) has two ſets of nectaries, one within the other; the outer of five three-parted, oblong bodies, placed in a ring within the petals, and of the ſame length with their tails; the inner of five little glands, which are certainly melliferous at top: it is obſervable that in the piſtilliferous flowers of this genus there are no glands or inner nectaries, and the outer ones are of the ſame ſize, and in the ſame ſituation, but differ in form, being roundiſh and didymous, or twinned.

Concerning the form and variations in the other parts of the fructification, which furniſh the generic characters of vegetables, enough is to be found in the elementary books (*i*): of the leaves alſo, together with thoſe other parts and circumſtances, furniſhing characters for the differences of about ten thouſand one hundred ſpecies, which is the whole number of plants at preſent known, there is no want of inſtruction in the ſame authors, tranſlated from Linnæus's original work. I ſhall only remark to you

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(*i*) Lee's Introduction; Roſe's Elements of Botany, &c.

therefore, that a more minute attention and accurate obſervation of vegetables, diſcovered to Linnæus parts that former botaniſts had paſſed by unnoticed; and that his ſuperior ſagacity and genius enabled him to make a much more extenſive uſe of ſuch as were already known. The parts I now allude to, are what he calls *Fulcra*, props or ſupports of the plant. Among theſe, the *Arms*, that is, Thorns and Prickles; Claſpers or Tendrils; ſome ſorts of *Pubeſcence*; and perhaps *Glands*, in ſome few ſpecies, had been noticed; but in a manner very looſe and imperfect: but the *Stipule*, which is a ſcale at the baſe of the petioles; and the *Bracte*, which is a ſcale or ſmall leaf next the flower, had not been ſo much as named; nor had any one thought of uſing theſe ſeven important though minute parts for diſtinguiſhing the ſpecies, a buſineſs to which they are ſo well adapted, both by their conſtancy and abundant variety.

He has alſo taken in other circumſtances very happily, beſides the mere *form*, to furniſh ſpecific differences, and for other purpoſes; ſuch as the mode and degree of *ramification* in leaves and branches, the *intorſion*, or manner of turning or bending in the ſtems; the *gemmation*, or various conſtruction of the buds; the *foliation*, or different folding of the leaves before they are expanded; the *infloreſcence*, or manner in which flowers are connected to the plant by their peduncles: all theſe, together with ſome others, which I have paſſed over, will occaſionally furniſh you with marks to diſtinguiſh plants from each other, even more certain in ſome caſes than the form itſelf, and therefore highly worthy of your attention; but I have already treſpaſſed on that too long, and will leave you to your leiſure and more important concerns.

LETTER XXXII.

October the 4th, 1777.

I Have at length found time, dear Couſin, to ſend you my laſt letter on the ſubject of Botany. I have not haſtened it, becauſe you have found full employment during the ſummer, either in examining ſuch plants as had eſcaped you before, or in ſearching for their nectaries and other more minute parts. You have alſo by this time diſcovered, that the ſtudy or amuſement which you have taken up, is not the affair of a ſingle ſeaſon.

As to the laſt and loweſt claſs of vegetables—*Cryptogamia*, I ſhall at preſent touch it very ſlightly, becauſe it is much too difficult for our young Couſin, and will probably be unintereſting even to you, unleſs you have already imbibed a greater paſſion for Botany than I wiſh you to have. The objects alſo of this claſs muſt be ſearched for in places, and at a ſeaſon by no means agreeable to your delicacy; and I will not have you riſk your health, the moſt precious gift of heaven, even in purſuit of the moſt delightful knowledge. Gentle exerciſe, ſuch as a proper attention to the ſtudy of nature will induce you to take, accompanied with that chearfulneſs, regularity, and temperance, for which you are ſo conſpicuous, is your beſt ſecurity for a continuance of this bleſſing: and that you may enjoy it uninterrupted to a period yet diſtant, my good wiſhes, and even prayers, if they may be of any avail, ſhall not be wanting.

You are already acquainted with the meaning of the name *Cryptogamia*, and the character of the claſs (*k*): you are alſo miſtreſs of the four Orders into which it is divided, together with their characters, ſuch as they are (*l*). I have only therefore to preſent you with a few of the moſt obvious ſpecies in each order, wherein the generic and ſpecific characters are the leaſt inconſpicuous.

The number of genera in this claſs are fifty-one, of ſpecies eight hundred and fifty-eight.

The plants of the firſt Order—the *Ferns*, are as large, and oftentimes as ſpecious as thoſe of the foregoing claſſes: it is apparent alſo to the naked eye, that there is a fructification, though the parts of it are not diſtinguiſhable. The general face of this, as it appears to the microſcope, has been already deſcribed (*m*).

(*k*) See page 101.

(*l*) See page 109, &c.

(*m*) In page 110.

In general the fructification in this Order of Ferns is on the backs of the leaves; that however is not univerſal. For inſtance, in the genus *Equiſetum*, or *Horſetail*, it is in a ſpike, each ſeparate fructification being peltate, and gaping at its many-valved baſe: *Corn Horſetail* (*n*) has theſe ſpikes on a naked ſtem, and other leafy barren ſtems come up later in the ſeaſon. *Wood Horſetail* (*o*) has the leaves compound, or divided, and the ſpikes at the end of the ſame ſtems. A ſpecies common in ditches (*p*) has ſcarcely any leaves, and is perfectly ſmooth; in which circumſtance alone it differs from the *Shave-graſs* (*q*) uſed in poliſhing, which is rough.

Ophiogloſſum alſo, or *Adder's-tongue*, has the fructifications on a ſpike, in a jointed row along each ſide of it; when they are ripe, theſe joints gape tranſverſely. Our common ſpecies (*r*), which is found in moiſt meadows, may be known by the *frond* or leaf being ovate.

Oſmunda likewiſe has a ſpike diſtinct from the *frond*; it is branching, and each component fructificatien is globular. *Moon-*

(*n*) Equiſetum arvenſe *Lin.*
(*o*) Equiſetum ſylvaticum *Lin.*
(*p*) Equiſetum limoſum *Lin.*
(*q*) Equiſetum hyemale *Lin.*
(*r*) Ophiogloſſum vulgatum *Lin.*

wort (*s*), which grows on dry paſtures, has one naked ſtem, and one pinnate frond, forming the whole of this little Fern. *Flowering-Fern*, or *Oſmund Royal* (*t*), a large ſpecies found on bogs, has bipinnate fronds, bearing the fructifications in a raceme at top. *Rough Spleenwort* (*u*) has lanceolate, pinnatifid fronds, with the diviſions confluent, quite entire and parallel: theſe are of two ſorts; the narrower being covered with fructifications on their backs, and the broader being barren. This therefore recedes from the character of the genus, in having a fertile frond inſtead of a ſpike, diſtinct from the barren one.

The remaining genera have the fructifications invariably on the back of the fronds. In *Acroſtichum* they cover the whole diſk. In *Pteris* they are to be found only round the edge: the *common Fern*, or *Brake* (*v*), which is ſo abundant in uncultivated grounds and woods, has ſupradecompounded or triply-pinnate fronds, the leaflets pinnate, the lobes lance-ſhaped; the loweſt pinnatifid, and the upper ones leſs.

Aſplenium has the fructifications in lines, that are frequently parallel. *Hart's-tongue* (*w*) has

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(*s*) Oſmunda Lunaria *Lin.*
(*t*) Oſmunda regalis *Lin.*
(*u*) Oſmunda Spicant *Lin.*
(*v*) Pteris aquilina *Lin.*
(*w*) Aſplenium Scolopendrium *Lin.*

has ſimple fronds, heart-tongued, that is drawn out into length, and hollowed next the petiole; quite entire, and the petioles ſhaggy: this grows on rocks and in ſhady places. There are ſeveral ſmaller ſpecies with pinnate or decompounded leaves; not uncommon on walls and rocks.

In *Polypody* the fructifications are in diſtinct roundiſh dots, placed in rows, and increaſing ſo much in ſize, as they advance to maturity, that they occupy the whole of the diſk in ſome ſpecies, and great part of it in others. *Common Polypody* (*x*) has pinnatifid fronds, the *pinnæ* or lobes oblong, a little toothed and obtuſe; the root is ſcaly: this is common on trees, walls, and rocks. Many ſpecies that are generally called Ferns; from the diſpoſition of the fructifications, are of this genus: of theſe, that which is moſt common, has vulgarly the name of *Male Fern* (*y*), and is found in woods, heaths, and on rocks, not covering the ground like the Brake, but in detached parcels: the fronds of this are doubly pinnate, the *pinnæ* or lobes obtuſe and crenulate, or ſlightly notched, and the ſtem chaffy.

Laſtly, *Adianthum* has the fructifications in terminal ſpots, under the margin of the

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(*x*) Polypodium vulgare *Lin.*

(*y*) Polypodium Filix mas *Lin.*

frond, which is folded back. *True Maidenhair* (z), which is uſed, or ſuppoſed to be ſo, in the ſyrup of Capillaire, is of this genus, and has decompounded fronds, the component leaves alternate, and the lobes wedge-ſhaped, lobate, and pedicled. It grows, but rarely, on rocks and walls.

The plants of the ſecond Order—the *Moſſes*, have leaves like the more perfect vegetables, diſtinct from the ſtalk; and in this they differ from the Ferns, in which the ſtalk and leaf always, and the fructification often, are blended, to form the *frond*. They are perennial, and when ever ſo much dried up, will revive again with moiſture; as Haller experienced in ſome ſpecimens of Caſpar Bauhin's *Hortus Siccus*, which muſt have lain in a dry ſtate above a century. You know them by their air, or habit, as Botaniſts uſually call it. A general idea of their fructification has been already given (*a*), as far as it is viſible to the naked eye; and we can only hope for a perfect account of it, from a laborious examination with glaſſes of conſiderable magnifying powers (*b*).

(z) Adianthum Capillus Veneris *Lin.*

(*a*) See page 110.

(*b*) This has now been done by *Hedwig*, in his *Fundamentum Hiſtoria Naturalis Muſcorum Frondoſorum*. Lipſiæ 1782, quarto, with coloured plates of the parts of fructification much magnified.

The generic characters of the Moſſes are taken from the heads, which are either ſeſſile, or elſe the plant puſhes them up on a ſlender, naked ſtem; this Linnæus calls the *Anther*, but I ſhall beg leave rather to name it the *Capſule* (*c*): in four genera (*d*) it is naked, or not covered with a *calyptre* or *veil*; in the other ſeven it is.

Lycopodium or *Wolf's-claw Moſs*, has a two-valved, ſeſſile capſule, without any calyptre. *Sphagnum*, or *Bog-moſs*, has the capſule covered with a lid, and a ſmooth mouth. The *gray* (*e*) ſpecies is common on bogs, covering vaſt tracts of them, and is known not only by its hoary appearance, but by its deflected branches.

Polytrichum has a capſule covered with a lid, ſitting on a ſmall protuberant eminence, which is a kind of receptacle, and is called by Linnæus *Apophyſis*, by Haller the *Diſk*; the capſule is covered by a villous calyptre. There is a ſtar or roſe on a diſtinct individual, which has been generally taken for the piſtilliferous flower; Haller rather thinks it is only a kind of bud, from which new branches ſpring. The common ſpecies, called *Greater golden Maidenhair* (*f*), is

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(*c*) As Linnæus thinks it really is. See *Genera*, p. 556.

(*d*) Lycopodium, Porella, Sphagnum & Phaſcum.

(*e*) Sphagnum paluſtre *Lin.*

(*f*) Polytrichum commune *Lin.*

known by its ſimple ſtem, and the parallelopiped form of the capſule. This is a large ſort of Moſs, and abundant in woods, heaths, and bogs.

The three remaining genera of Moſſes, which are alſo the principal and moſt numerous, are thus diſtinguiſhed. *Mnium* agrees with Polytrichum in having two ſorts of fructification; the one a lidded capſule, covered with a ſmooth calyptre; the other a ſtar or roſe, in the diſk of which are ſome globoſe little duſty bodies. *Bryum* and *Hypnum* have none of theſe ſtars or roſes: theſe have both a lidded capſule, covered with a ſmooth calyptre, and are diſtinguiſhed from each other, by the ſtalk which ſupports the capſule being naked, and ariſing from a terminal tubercle in the firſt; whereas in the ſecond it ſprings from the ſide of the branch, and is ſurrounded at bottom by a *perichætium*, ſcaly ſheath, or receptacle.

One ſpecies of *Mnium*, whoſe filaments or capſular ſtalks are ſo ſenſible of moiſture, that it has obtained the name of *hygrometric* (*g*), has no ſtems, nodding turbinate or pear-ſhaped capſules, reflected four-cornered calyptres, and ovate leaves forming a head; they are of a yellowiſh green, and the filaments are an inch and half high, and red or orange-coloured.

(*g*) Mnium hygrometricum *Lin.*

One of the moſt common ſpecies of *Bryum* is the *hairy* (*h*), which covers the old thatch of cottages; this has the capſules rather erect, and the leaves ending in a hair, and recurved. *Apple-form Bryum* (*i*) has large ſpherical heads; and in the *Pear-form* ſpecies (*k*) they are obovate, covered with an awl-ſhaped calyptre; the ſhoots are ſtemleſs, and the leaves are ovate and awnleſs. *Brown Bryum* (*l*) has erect roundiſh capſules, with a pointed lid. This is a very ſmall Moſs, growing cloſe to the ground in thick tufts; the filaments are three or four lines high, and when the capſules have loſt their lid, they have a truncated appearance, whence their name.

Silky Hypnum (*m*), one of the moſt beautiful, and not the leaſt common of the genus, is known by its creeping ſhoots, its crowded erect branches, its awl-ſhaped leaves, and erect capſules. This grows both in dry places, ſuch as on walls or trees, and in wet ones, as meadows; in the firſt the leaves are narrow, and preſſed cloſe to the ſtalk, in the ſecond they are broader, ſpreading, and ſhining, like ſilk: the capſules are long, round, enlarging a little at bottom, with a ſlender ciliated mouth, a ſcarlet

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(*h*) Bryum rurale *Lin.*

(*i*) Bryum pomiforme *Lin.*

(*k*) Bryum pyriforme *Lin.*

(*l*) Bryum truncatulum *Lin.*

(*m*) Hypnum ſericeum *Lin.*

beaked lid, and a pale calyptre; they are ſupported by a purple ſtalk or filament from half an inch to an inch in height, ſurrounded at the baſe by a ſhort thick ſcaly *perichætium*. This may ſerve as a ſpecimen of the numerous ſpecies of *Hypnum*; and we will now paſs on to the third Order of the *Cryptogamia* Claſs, containing the

Algæ or *Flags*, which are chiefly the *Lichens* or *Liverworts*, *Sea-weeds*, and ſome few commonly called *Moſſes*, but having in reality the character of this Order (*n*). Of theſe laſt, *Common Marchantia* (*o*) may ſerve as an inſtance: it grows by ſtreams and fountains, in wet ſhady places, and on walls ſubject to a drip. There are two diſtinct fructifications in this genus, one ſtanding out from the plant on a peduncle, and conſiſting of a peltated calyx or receptacle, covered with ſmall one-petalled corols underneath, each of which has one multifid anther or capſule; the other ſeſſile, ſhaped like a cup or bell, and containing many little roundiſh bodies, which ſome take for ſeeds. The ſpecies here pointed out is diſtinguiſhed by the common calyx being ten-cleft: it varies much in its appearance, and hence has its trivial name of many-form. This genus is evidently the connecting link be-

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(*n*) See page 111.

(*o*) Marchantia polymorpha *Lin.*

tween the Moſſes, and the *Lichens*, which we ſhall now examine.

This genus has a roundiſh, flattiſh, ſhining receptacle, or common calyx, ſeldom elevated; and a meal ſprinkled over the leaves. The receptacle affording a variety of forms, has ſuggeſted a ſubdiviſion of this otherwiſe unwieldy genus, the leaf and manner of growth taking their parts in it. *Lichens* abundantly clothe the earth, rocks, and vegetables, eſpecially trees; in the form of meal, cruſt, leaf, or thread: age, ſoil, and ſituation make ſo great a difference in their appearance, that numberleſs varieties have been advanced into ſpecies. The ſections of the genus are, 1. The *Tuberculate*, conſiſting of a cruſt adhering cloſely to the bark of trees, or ſtones, above which roundiſh tubercles riſe a little; theſe are rather irregular, a little flatted at top, and without any rim round them. Sometimes they run into regular figures, and reſemble writing (*p*), or a map (*q*). 2. *Scutellate*, or ſuch as have little ſhields, or roundiſh receptacles with a rim, and the diſk ſomewhat depreſſed, ariſing from a granulous cruſt more approaching to a leafy ſtructure than in the former ſection, and not adhering ſo ſtrongly. 3. *Im-*

(*p*) Lichen ſcriptus *Lin.*
(*q*) Lichen geographicus *Lin.*

bricate, compoſed of many ſmall leaves, generally in an orbicular form, laying over each other, the leaſt in the middle, and the largeſt on the outſide; from ſome of theſe ariſe little ſhields, and others have little mealy tubercles at the ends of the leaves. Nothing is more common than a yellow ſpecies (*r*) of this ſection, on trees, walls and rocks; the leaflets of it are curled, deep yellow above and aſh-coloured beneath; the ſhields are of a lighter yellow, grow brown with age, and are thick ſet towards the middle of the plant; other ſpecimens inſtead of ſhields have a yellow meal ſpread over them: the leaves by age become greeniſh, and then of a browniſh aſh colour, warted and leprous. 4. *Leafy*, properly ſo called, conſiſting of one continued leafy ſubſtance, variouſly laciniate, cut or torn: theſe have generally large, wide ſhields, often on peduncles, either in the diviſions of the leaves, or on their edges. *Lungwort* or *Tree Lichen* (*s*) which hangs from old oaks and beeches in woods, has very large jagged leaves, ſmooth, and ending obtuſely, the upper ſurface is wrinkled and pitted, the lower downy: the ſhields are of the ſize of a lentil, and placed on the edges of the leaves. 5. *Coriaceous* or *Leathery*: theſe are alſo leafy, but differ from thoſe of the

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(*r*) Lichen parietinus *Lin.* Wall Liverwort.

(*s*) Lichen pulmonarius *Lin.*

the fourth ſection in conſiſting of ſeveral leaves, of a tougher texture, broader, leſs ſharply laciniate, not branching, and generally adhering cloſer to the bodies on which they grow; the receptacles are very large, and from their reſemblance to the round ſhields of the ancients, called *Peltæ*; they are generally on the edges of the leaves, and little or not at all notched on the edges. *Aſh-coloured Ground Liverwort* (*t*), is of this ſection: it is creeping, lobate, obtuſe and flat, veined underneath and villous, with a riſing *pelta* or target on the edge: this ſpecies is very common on the ground in woods, and on heaths, particularly on old ant-hills: the leaves are aſh-coloured, and white underneath. 6. *Umbilicate* or hollowed like the navel, and ſooty or appearing black or as if burnt. 7. *Cup-bearing*, conſiſting of a granulous cruſt, in proceſs of time unfolding into little leaves irregularly laciniate: from theſe ariſes a ſtipe or ſtem ſupporting hollow conical receptacles reſembling little tea-cups or glaſſes, whoſe edge is often ſet with brown or ſcarlet tubercles. The different appearances of *Cup-moſs* are probably but varieties ariſing from the different age of the plant. 8. *Shrubby*, or reſembling ſhrubs or

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(*t*) Lichen caninus *Lin.* This is the ſpecies recommended againſt the bite of mad dogs, mixed with white pepper.

coral : theſe conſiſt of a leafy cruſt like the laſt, but they have no cups, only tubercles, and they are branched. The famous *Rhendeer Moſs* (*u*) is of this ſection : it is perforate (*v*), very much branched, and the ſmall branches are nodding : it grows on heaths and mountainous paſtures with us. 9. *Thready*, or conſiſting of mere round, ſolid, ſtiff ſtalks or threads, frequently covered or incruſted with a meal, which is very inflammable, and terminating in dry globules, a little hollowed and without any rim. Theſe moſt of them hang from the boughs of trees, and hence have the name of *Tree-Moſs.* But this very numerous and widely diffuſed genus has already detained us too long.

The *Sea-weeds* are comprehended in three genera—*Ulva* or *Laver*, *Fucus* and *Conſerva.* In the firſt the fructifications are in a diaphanous membrane, and the ſubſtance of the plant is membranaceous, at firſt bladdery, but afterwards leafy. *Fucus*, *Wrack*, or *Sea-weed* properly ſo called, has two kinds of bladders, the one ſmooth, hollow and interwoven with hairs, the other ſmooth filled with a gelly, in which are immerſed ſmall perforated grains, in each of which is ſuppoſed to be a ſeed : the texture of theſe

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(*u*) Lichen rangiferinus *Lin.*

(*v*) That is, there are little holes in the alæ of the branches, as if made with a pin.

plants is *coriaceous* or leathery. *Confervæ* are compoſed of unequal tubercles, in very long capillary fibres, which are either continued or jointed. The two laſt genera will furniſh you with abundant amuſement, whenever you are led to ſpend a little time on the ſea coaſt; but the ſpecies are ſo numerous, that the examination of the ſpecific differences would carry me into too wide a field: we will paſs on therefore to the laſt Order of this laſt Claſs of Vegetable Nature—the *Fungi* or *Muſhrooms*, which are univerſally known by their ſingular ſtructure and appearance; without branches, leaves, flowers, or any thing we can certainly call fructification, and ſcarcely any root. The *Agaric*, one of the principal genera in this Order, is known by its horizontal manner of growing, and by having *lamellæ* or gills underneath. The *Champignon* (*w*), or common eatable Muſhroom, is one of theſe, and has the following characters—the head is convex, ſcaly, white; and ſupported on a ſtipe or ſtalk; the gills are red; that which has white gills is only a variety of this, and though far inferior in quality, is not poiſonous. The *Chantarelle* (*x*), or little yellow Muſhroom, ſo common in the Fairy rings on dry paſtures, is alſo ſtipitate, with the

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(*w*) Agaricus campeſtris *Lin.*
(*x*) Agaricus Chantarellus *Lin.*

gills branched and decurrent. What is commonly called *Agaric* in medicine, and is uſed in ſtopping of blood, is of another genus,

Boletus, which grows horizontally like the laſt, but inſtead of gills, has pores on the under ſurface.

Morel (y) is a Fungus that is reticulate or netted all over the outſide or upper ſurface, and ſmooth beneath. The eſculent ſpecies has the head egg-ſhaped and cellular, the ſtipe or ſtem naked and wrinkled.

Truffle, or *eſculent Puff-ball* (z), is a roundiſh Fungus, filled with a mealy ſubſtance, taken for ſeeds: this ſpecies is globular, ſolid, muricated or rough on the outſide, without any root, and growing wholly under ground: the other ſorts are full of duſt, which they throw out when ripe, and are wholly above ground except their roots. *Common Puff-ball* (*a*) is roundiſh, and diſcharges its duſt by a torn aperture in the top; this varies much in form, and alſo in ſize, from a little ball to that of a man's head.

After all, the objects of this Order are not now univerſally allowed to be plants, but are ſuſpected to be formed by animals,

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(*y*) Phallus eſculentus *Lin.*
(z) Lycoperdon Tuber *Lin.*
(*a*) Lycoperdon Boviſta *Lin.*

for their habitation, after the manner of Zoophytes or Corals. But this is a ſubject too difficult and nice for our diſcuſſion: and perhaps, after all, the *Fungi* may prove to be one of thoſe links in the chain of nature, which unite the Vegetable to the Animal kingdom; and though they ſhould turn out to be the habitation of minute inſects, and to be formed for and by them, yet they may at the ſame time have the growth and texture of Plants. Nature is full of theſe wonders, dear Couſin; we are admitted to the view of a very ſmall portion of it only; there is little hope then that we ſhould be able to underſtand its relations fully, or to unravel all its myſteries.

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